

LIST OF MATERIALS

Acceptable for Use on Systems of RUS Electrification Borrowers

**United States Department of Agriculture
Rural Utilities Service**

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DISCLAIMER

*Every effort has been made to ensure the accuracy of this document.
However, in case of discrepancies, records of Technical Standards
Committee "A" are the authoritative source.*

PREFACE

This list supersedes all preceding issues including revisions. Revised sheets reflecting changes in the list will be issued quarterly and should be inserted in order to keep your copy up to date.

The items shown in this publication include material and equipment for transmission and distribution facilities. Items not listed include office equipment, tools and work equipment, items of electric general plant and consumer owned wiring facilities. The listings apply only to new items of material and equipment and not to used items.

In addition to items accepted on a general basis, this list also includes items accepted on a conditional basis. As one of the conditions in the acceptance of an item on a conditional basis, contractors are required to obtain the borrower's concurrence prior to its use.

The inclusion of an item in this list does not indicate that item's manufacturer or its principals have not been debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded pursuant to Executive Order 12549, Debarment or Suspension, or any rules or regulations issued thereunder, including 7 CFR Part 3017 ("Debarment Regulations"). Therefore, borrowers must comply with the requirements imposed by the Debarment Regulations before entering into any "covered transaction", as defined by 7 CFR Part 3017, involving any item on this list.

The acceptance of an additional item or the deletion of an existing item is a function of the Technical Standards Committees. Any manufacturer desiring to have a new item placed on the list, or any user believing an existing item should be removed from the list, is invited to submit the matter to the Committees. Any communication calling attention to an error or omission in the list, such as a wrong catalog number, an obsolete item, etc., will be appreciated. All communications should be addressed to Technical Standards Committee "A" (Electric), Rural Utilities Service, Stop 1569, U. S. Department of Agriculture, Washington, D. C. 20250-1569.

INDEX - PART I

-A-

| | |
|---|------|
| Air break switches..... | cg |
| Anchor rod..... | x |
| Anchor rod bonding clamps | ck |
| Anchor shackle..... | bo |
| Anchors | z |
| Angle suspension bracket | cr |
| Angle thimble eye bolt | ba |
| Anodes | U si |
| Arm assemblies, narrow profile..... | eq |
| Armor grip suspension assembly | m |
| Armor grip suspension assembly with socket eye..... | ei |
| Armor rods..... | bv |
| Arms, laminated upswept..... | fq |
| Arresters, surge | ae |
| Automatic and formed type deadends..... | by |
| Automatic splices..... | bx |

-B-

| | |
|--|----|
| Ball hook | eh |
| Ball, oval eye..... | fp |
| Ball, Y-clevis | ft |
| Bolt, angle eye (thimble type) | ba |
| carriage | i |
| clevis..... | ef |
| double arming..... | n |
| double upset..... | q |
| oval eye..... | o |
| eye double arming | dy |
| machine..... | c |
| shoulder eye | o |
| single upset | bs |
| thimble eye, angle | ba |
| straight eye (thimble eye) | ao |
| Brace, crossarm, steel | h |
| crossarm, fiber reinforced plastic | cu |
| crossarm, wood | cu |
| sidearm diagonal | ac |
| sidearm vertical | bb |
| special crossarm..... | em |
| Bracket, angle suspension | cr |
| cutout and arrester extension..... | fm |
| cutout extension | fn |
| extension..... | fj |
| insulated | da |
| narrow profile..... | eq |
| offset neutral | ec |
| oil circuit recloser..... | fk |
| pole top pin..... | cs |
| post insulator | eb |
| swinging angle..... | fu |
| transformer | dm |
| transformer secondary insulated | fo |

| | |
|---|----|
| Capacitor hangers | fd |
| Capacitor oil switch..... | bz |
| Capacitor, shunt | fc |
| Carriage bolt..... | i |
| Chain link (end link) | br |
| Clamp, anchor rod bonding..... | ck |
| deadend | l |
| deadend with socket eye..... | ej |
| ground rod | aj |
| ground wire..... | dp |
| guy | u |
| hot line | ap |
| loop deadend..... | bn |
| suspension | m |
| suspension with socket eye..... | ei |
| Clevis bolt | ef |
| Clevis type wireholder..... | bt |
| Clevis, conduit, insulated | dr |
| secondary swinging | s |
| service deadend | bh |
| service swinging | as |
| thimble | ci |
| Clip, ground wire..... | al |
| guy | dz |
| Combination cutout and arrester | ax |
| Combination power fuse and disconnect switch | sl |
| Compression deadends | cp |
| Compression splices..... | cy |
| Conductor | av |
| Conduit clevis, insulated | dr |
| Conduit wireholder..... | ds |
| Connector, grounding, transformer | bu |
| hot line | fi |
| Connectors | p |
| Cross brace assembly..... | vx |
| Crossarm assemblies and arm spacers..... | gj |
| Crossarm assembly, "Z" type (wishbone) | gz |
| Crossarm assembly, H frame (small angle - 161 & 230 kV) | gw |
| Crossarm assembly, H frame (tangent - 161 & 230 kV)..... | gy |
| Crossarm brace, sidearm diagonal..... | ac |
| Crossarm brace, sidearm vertical | bb |
| Crossarm brace, special | em |
| Crossarm brace, steel..... | h |
| Crossarm brace, wood | cu |
| Crossarm pin, steel..... | f |
| Crossarm reinforcing plate..... | eg |
| Crossarm saddle..... | fg |
| Crossarms | g |
| Current limiting backup fuses..... | ag |
| Current transformers..... | sd |
| Cutout and arrester extension bracket..... | fm |
| Cutout and arrester, combination..... | ax |
| Cutout extension bracket | fn |
| Cutouts and fuses..... | af |

-D-

| | |
|---------------------------------------|----|
| Deadend clamp | l |
| Deadend clamp with socket eye..... | ej |
| Deadend for guy strand | u |
| Deadend for steel strand..... | l |
| Deadend, automatic & formed type..... | by |
| compression | cp |
| secondary..... | cq |
| service..... | dt |
| Disconnect switch, hook operated..... | sb |
| Double arming bolt | n |
| Double arming eye bolt..... | dy |
| Double arming plate | ct |
| Double upset bolt..... | q |

-E-

| | |
|-----------------------------------|----|
| Elliptical eye screw | dq |
| End link (chain link) | br |
| Extension link | du |
| Extension link (fiberglass) | eu |
| Eye bolt, double arming | dy |
| oval | o |
| Eye nut | aa |
| Eye screw, elliptical | dq |

-F-

| | |
|---|----|
| Fiber reinforced plastic crossarm braces..... | cu |
| Fuses and cutouts..... | af |
| Fuses, current limiting, backup | ag |
| power, substation..... | af |

-G-

| | |
|--|----|
| Gain, pole..... | bi |
| Grid gain..... | bi |
| Ground rod clamp..... | aj |
| Ground rods..... | ai |
| Ground wire clamp | dp |
| Ground wire clip..... | al |
| Ground wire staple..... | al |
| Ground wire support, overhead..... | ed |
| Ground wire, pole | cj |
| Ground, pole..... | dh |
| Grounding conductor, substation, coated steel..... | sr |
| Grounding connector, transformer | bu |
| Guy attachment (Distribution) | v |
| Guy attachment (Transmission)..... | fv |
| Guy clamp | u |
| Guy clip | dz |
| Guy deadend..... | u |
| Guy hook..... | bj |
| Guy marker | at |
| Guy plate..... | bk |

| | |
|---------------------------|----|
| Guy strain insulator..... | w |
| Guy wire | y |
| Guy wire clip..... | dz |
| Guying plate..... | fv |

-H-

| | |
|--|----|
| H frame crossarm assembly (small angle - 161 & 230 kV) | gw |
| H frame crossarm assembly (tangent - 161 & 230 kV) | gy |
| Hangers, capacitor..... | fd |
| Hook, ball | eh |
| guy | bj |
| Hook operated disconnect switch..... | sb |
| Hot line clamp | ap |
| Hot line connector..... | fi |

-I-

| | |
|-------------------------------------|----|
| Insulated bracket | da |
| Insulator and stud, post type | ea |
| Insulator, guy strain | w |
| pin type..... | a |
| polymer distribution deadend | k |
| spool..... | cm |
| suspension | k |

-K-

| | |
|-----------------|---|
| Keys, pole..... | z |
|-----------------|---|

-L-

| | |
|-----------------------------|----|
| Laminated upswept arms..... | fq |
| Lag screw | j |
| Link, chain (end link)..... | br |
| extension..... | du |
| extension (fiberglass)..... | eu |
| Locknuts | ek |
| Loop deadend clamp | bn |

-M-

| | |
|------------------------|----|
| Machine bolt..... | c |
| Marker, guy | at |
| Meter sockets | gb |
| Meters, watthour | ga |

-N-

| | |
|---|----|
| Narrow profile brackets and arm assemblies..... | eq |
| Neutral bracket, offset | ec |
| Numbers, pole and letters..... | az |
| Nut, eye..... | aa |
| thimble eye..... | ab |

-O-

| | |
|------------------------------------|----|
| Offset neutral bracket | ec |
| Oil circuit recloser bracket | fk |
| Oil circuit reclosers | be |
| Oval eye ball | fp |
| Oval eye bolt | o |
| Oval tube splice..... | cx |
| Overhead ground wire support..... | ed |

-P-

| | |
|-----------------------------------|----|
| Pin type insulator | a |
| Pin, crossarm | f |
| pole top, steel | b |
| Pipe spacer | dl |
| Plastic wire guard | er |
| Plate, crossarm reinforcing | eg |
| double arming..... | ct |
| guy | bk |
| pole bearing..... | fs |
| pole eye..... | v |
| Pole bearing plate..... | fs |
| Pole eye plate..... | v |
| Pole gain | bi |
| Pole ground | dh |
| Pole ground wire..... | cj |
| Pole keys..... | z |
| Pole numbers and letters | az |
| Pole top pin bracket | cs |
| Pole top pin, steel..... | b |
| Post insulator bracket | eb |
| Post type insulator and stud..... | ea |
| Power fuses, substation | af |
| Primary metering rack | fl |

-R-

| | |
|-----------------------------------|----|
| Rack, primary metering | fl |
| Reclosers, automatic circuit..... | be |
| Regulator by-pass switch | sk |
| Regulators, voltage..... | sc |
| Rod, anchor..... | x |
| Rods, armor..... | bv |
| ground | ai |

-S-

| | |
|--------------------------------|----|
| Saddle crossarm..... | fg |
| Screw, elliptical eye | dq |
| lag | j |
| Secondary swinging clevis..... | s |
| Sectional ground rods..... | ai |
| Sectionalizer..... | el |
| Service deadend..... | dt |
| Service deadend clevis..... | bh |
| Service swinging clevis..... | as |

| | |
|--|----|
| Shackle, anchor..... | bo |
| Shoulder eye bolt..... | o |
| Shunt capacitors..... | fc |
| Sidearm diagonal crossarm brace..... | ac |
| Sidearm vertical crossarm brace | bb |
| Single upset bolt..... | bs |
| Sockets, meter | gb |
| Spacer, pipe | dl |
| Special crossarm braces..... | em |
| Splice cover, plastic..... | es |
| Splice for steel strand | cz |
| Splice, automatic..... | bx |
| compression | cy |
| formed type | ex |
| oval tube | cx |
| Spool Insulator..... | cm |
| Spring washer..... | aw |
| Staple, ground wire..... | al |
| Steel strand | y |
| Structure assembly (small angle - 161 & 230 kV)..... | gw |
| Structure assembly (tangent - 161 & 230 kV) | gy |
| Substation grounding conductor, coated steel | sr |
| Support, overhead ground wire | ed |
| Surge arresters..... | ae |
| Suspension clamp | m |
| Suspension clamp with socket eye..... | ei |
| Suspension insulator..... | k |
| Swinging angle bracket..... | fu |
| Switch, capacitor oil..... | bz |
| combination power fuse and disconnect..... | sl |
| hook operated disconnect | sb |
| pole top air break..... | cg |
| recloser, by-pass | sj |
| regulator by-pass | sk |

-T-

| | |
|--|----|
| Thimble clevises..... | ci |
| Thimble eye bolt, angle | ba |
| Thimble eye bolt, straight..... | ao |
| Thimble eye nut..... | ab |
| Tie, insulator, formed type | ah |
| Transformer bracket | dm |
| Transformer grounding connector | bu |
| Transformer secondary bracket, insulated | fo |
| Transformers, current | sd |
| pole and power | an |
| voltage | se |

-V-

| | |
|-------------------------------|----|
| Vacuum circuit reclosers..... | be |
| Voltage regulators..... | sc |
| Voltage transformers | se |

-W-

| | |
|-------------------------------|----|
| Washer, spring | aw |
| Washers | d |
| Watthour meters..... | ga |
| Wildlife guards..... | rp |
| Wire guard, plastic..... | er |
| Wire, guy..... | y |
| Wireholder..... | ar |
| Wireholder, clevis type | bt |
| conduit..... | ds |
| Wood crossarm brace..... | cu |

-Y-

| | |
|---------------------|----|
| Y-clevis ball | ft |
|---------------------|----|

-Z-

| | |
|--|----|
| "Z" type (wishbone) crossarm assembly..... | gz |
|--|----|

INDEX - PART II

Underground Distribution Equipment

| | |
|---------------------------------------|------|
| Anodes | U si |
| Arrester, surge | U ae |
| Boot, insulated..... | U gq |
| Bracket, combination | U hj |
| pothead mounting | U hd |
| Cable..... | U hv |
| Cable accessories..... | U hb |
| Cable route marker..... | U hx |
| Cable support | U hc |
| Combination cutout and arrester | U ax |
| Connector block, secondary..... | U gp |
| transformer | U fz |
| Connector, secondary tap | U fw |
| Cutout and arrester, combination..... | U ax |
| Enclosure, equipment | U gn |
| sectionalizing equipment | U he |
| Fault indicator..... | U go |
| Heat shrink tubing..... | U hr |
| Jacketed cable restoration kits..... | U hf |
| Pad, transformer..... | U ja |
| Pedestal, power | U gu |
| Recloser, pad-mounted..... | U be |
| Regulator, voltage, pad-mounted..... | U sc |
| Secondary tap connector | U fw |
| Secondary tap or splice cover..... | U hr |
| Shield, cable riser..... | U gc |
| splice..... | U jb |
| Splice shield | U jb |
| Splice, secondary | U gp |
| underground | U hy |
| Stake, power pedestal | U gv |
| Switch, air, group-operated | U cg |
| Terminations, elbow..... | U hp |
| multipoint..... | U hq |
| outdoor and indoor..... | U gk |
| Terminator sealing kit | U hf |
| Transformer connector block | U fz |
| Transformer pad..... | U ja |
| Transformer, current..... | U sd |
| Transformers | U an |
| Tubing, heat shrink | U hr |
| Warning sign | U hw |

a - Insulator, pin type

| | | | |
|--|--|---|--|
| ANSI Class | 55-2 | 55-3 | 55-4 |
| Application | 5 kV | 12.5/7.2 kV and 13.2/7.62 kV systems | 12.5/7.2 kV and 13.2/7.62 kV systems (where greater insulation is needed) |
| Pinhole diameter | 1 in. | 1 in. | 1 in. |
| Porcelain Products (Knox) ² | 253 | 261-S | 366-S |
| Victor Insulators, Inc. | 8 | 5 | 6 |
| ANSI Class | 56-1 | 56-3 | 56-4 |
| Application | 24.9/14.4 kV distribution lines | 33 - 34.5 kV transmission lines | 44 - 46 kV transmission lines |
| Pinhole diameter | 1-3/8 in. Metal thimble (unless noted) | 1-3/8 in. Metal thimble | 1-3/8 in. Metal thimble |
| Porcelain Products (Knox) ² | - | 2045-S | - |
| Victor Insulators, Inc. | 27-R ¹ | 245-R | 255-R |

¹Does not have a metal thimble.

²ANSI class 55-2, 55-3, 55-4, and 56-1 pin insulators manufactured at both the Knoxville and Macomb plants are acceptable.

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a - Insulators, pin type (polymer)

| Manufacturer | Conditions |
|--|-----------------------|
| Hendrix* HPI-15, 12.5/7.2 kV, ANSI Class 55-3 HPI-15-F, 12.5/7.2 kV, ANSI Class 55-4 HPI-25-J-02, 24.9/14.4 kV, ANSI Class 56-1 | To obtain experience. |

*Does not have metal thimble.

b - Pin, pole top, steel

DISTRIBUTION

| | 12.5/7.2 or 13.2/7.62 kV | 24.9/14.4 kV |
|--------------------------|-----------------------------|--------------|
| Pin length, inches: | 20 | 20 |
| Thread diameter, inches: | 1 | 1-3/8 |
| Hole spacing, inches: | 8 | 8 |
| RUS Specification: | D-3 | DT-3 |
| Dixie | D-2172-R | D2195-R |
| Hubbell (Chance) | 2199 | 2195 |
| Joslyn | J740 | J720 |
| Kortick | - | K8086 |
| MacLean (Continental) | U36606F-REA | U36652 |

Pins listed below have 4-1/2" offset which eliminates the use of Item cs

| | |
|-----------------------|-----------|
| Hubbell (Chance) | C206-0271 |
| Joslyn | J25179 |
| MacLean (Continental) | U36549 |

TRANSMISSION

| | |
|--------------------------|---------|
| Pin Length, inches: | 24 |
| Thread diameter, inches: | 1-3/8 |
| Hole spacing, inches: | 8 |
| RUS Specification: | DT-3 |
| Hubbell (Chance) | 2196 |
| Kortick | K8087 |
| MacLean (Continental) | U36653F |

NOTE

1. Flared type pins may be mounted with either side against the pole.

b - Pin, pole-top
(Non-lead threads)

| Manufacturer | Conditions |
|---|-----------------------|
| Hubbell Power Systems 2199P (1" threads) | To obtain experience. |
| Hughes Brothers 2770-A20-100 (1" threads) 2770-A20-130 (1-3/8" threads) | To obtain experience. |
| Joslyn J740Z (1" threads) J720Z (1-3/8" threads) | To obtain experience. |

b - Pin, Fiber-reinforced plastic pole top

| Manufacturer | Conditions |
|---|-----------------------|
| Joslyn 7581-624NT (1" threads)* 7581-624XNT (1-3/8" threads)* | To obtain experience. |
| * Add suffix LT (less tabs) if for steel pole. | |

c - Bolt, machine

Applicable Specification: ANSI C135.1, "Standards for Galvanized Steel Bolts and Nuts" except that the lengths are in the ranges given below.

Applicable Sizes: 1/2 inch diameter, 6 through 10 inch length
 5/8 inch diameter, 6 through 24 inch length
 3/4 inch diameter, 6 through 26 inch length
 7/8 inch diameter, 6 through 28 inch length

The following manufacturers have shown compliance with the applicable specifications for machine bolts:

Dixie Electrical Manufacturing Company
Hughes Brothers
* Joslyn Manufacturing Company
Kortick Manufacturing Company
MacLean (Continental)
* Portland Bolt & Manufacturing Company
The Rockford Bolt & Steel Company
Steel City Bolt & Screw Co., Inc.

*"Static proof" design available.

d - Washers, Flat

Flat Rolled Steel

| Size, inches: | 2-1/4 x 2-1/4 | 3 x 3 | 4 x 4 | 4 x 4 | 1-3/8 round | 1-3/4 round |
|-----------------------|-----------------|----------|----------|-------------|----------------|----------------|
| Thickness, in.: | 3/16 | 1/4 | 3/16 | 1/2 | 12 gauge | 10 gauge |
| Hole Diam., in.: | 13/16 | 13/16 | 13/16 | 13/16 | 9/16 | 11/16 |
| C & C Spacer | 4 | - | - | - | - | - |
| Dixie | D6814 | D6817 | D6818 | D6819-1/2 | D6803 | - |
| FWC | FW1076 | - | FW1080 | - | FW1086 | FW1088 |
| Hubbell (Chance) | 6814 | 6817 | 6818 | 6819-1/2 | 6803 | 6805 |
| Hughes | SW2-1/4-70-3/16 | SW3-70 | SW4-70 | SW4-70(1/2) | RW1-3/8-50 | - |
| Joslyn | J1076 | J1079 | J1080 | - | J1086 | J1088 |
| Kortick | K1553 | K1555 | K1557 | K1559-1/2 | K1524 | K1525 |
| Line Hardware | SWF-225B | SWF-300B | SWF-400A | - | - | - |
| MacLean (Continental) | U5485 | U5487A | U5488 | U5490A | U5478 | U5479 |
| Wrought Washer | 011206 | - | - | - | - | - |

Flat Cast

| | |
|----------------------|-------|
| Size, inches: | 3 x 3 |
| Thickness, in.: | 1/4 |
| Hole Diam., in.: | 13/16 |
| Hubbell (Chance) (N) | BB214 |
| Joslyn (Flagg) (N) | P56A |

Spurred - 3" Round, 3/16" Thick, 13/16" Hole

| | |
|-----------------------|-----------|
| MacLean (Continental) | TCSF-30-6 |
|-----------------------|-----------|

(A) Aluminum Alloy
(M) Malleable Iron
(N) Nodular Iron

d - Washers, Curved

Curved Cast

| | | | | |
|------------------------|---------------|---------|---------|---------|
| Size, inches: | 2-1/4 x 2-1/4 | 3 x 3 | 3 x 4 | 4 x 4 |
| Thickness, in.: | 1/4 | 5/16 | 7/16 | 1/2 |
| Hole Diam., in.: | 11/16 | 11/16 | 15/16 | 13/16 |
| Hubbell (Chance) (N) | GCW1A | GCW31 | CRW4A | GCW41 |
| Joslyn (Flagg) (M) | P141 | P143 | P120 | P144 |
| Line Hardware (M) | - | CW 33-5 | CW 34-7 | CW 44-6 |
| MacLean (Bethea) | - | WC-33-5 | WC-34-7 | WC-44-6 |
| MacLean (Continental) | - | CW-33-5 | CW-34-7 | CW-44-6 |
| Universal Electric (A) | UW-225 | UW-335 | UW-347 | UW-446 |

(A) Aluminum Alloy

(M) Malleable Iron

(N) Nodular Iron

Curved Rolled Steel

| | |
|------------------|----------|
| Sizes, inches: | 4 x 4(1) |
| Thickness, in.: | 1/4 |
| Hole Diam., in.: | 15/16 |
| Joslyn (Steel) | J6829 |

(1) To be used only on transmission systems.

f - Pin, crossarm
(With square washer, nut and MF locknut)

DISTRIBUTION

| | | | | |
|-------------------------|-------------------|--------|--------------------|-------|
| Thread (inches diam.) | 1 | 1-3/8 | 1 | 1-3/8 |
| Length above base (in.) | 5 | 7 | 5 | 7 |
| Length below base (in.) | 5-3/4 | 7 | 1-1/2 | 1-3/4 |
| Shank (inches diam.) | 5/8 | 5/8 | 5/8 | 3/4 |
| | <u>Long Shank</u> | | <u>Short Shank</u> | |
| Dixie | D881 | - | - | - |
| Hubbell (Chance) | 881 | 4717 | 886 | - |
| Joslyn | J203 | J647 | J221 | J630 |
| Kortick | K7104 | K7611 | K7122 | K7631 |
| MacLean (Continental) | U558 | U3137A | U579 | U3142 |

Clamp Type Pin

| | | |
|-------------------------|-------|---------|
| Thread (inches diam.) | 1 | 1-3/8 |
| Length above base (in.) | 5-3/4 | 7 |
| Dixie | D3322 | D3324 |
| Hubbell (Chance) | 14322 | 14322-1 |
| Joslyn | J3322 | J3324 |

Washer Plate for Clamp Type Pin

These plates are equipped with lugs to prevent slippage of pin along crossarm. They may be used to replace the bottom plate on pins already installed.

Hubbell (Chance) 450091

f - Pin, crossarm
(With square washer, nut and locknut)

TRANSMISSION

| | | |
|----------------------------|-------------------|--------------------|
| Thread (inches diameter) | 1-3/8 | 1-3/8 |
| Length above base (inches) | 10 | 10 |
| Length below base (inches) | 7 | 1-3/4 |
| Shank (inches diameter) | 3/4 | 3/4 |
| | <u>Long Shank</u> | <u>Short Shank</u> |
| Hubbell (Chance) | 4332 | - |
| Joslyn | J610 | J633 |
| Kortick | K7643 | K7635 |
| MacLean (Continental) | U3140 | U3145 |

f - Pin, crossarm
(Non-lead threads)
(With square washer, nut and MF locknut)

| Manufacturer | Conditions |
|---|-----------------------|
| <u>Hubbell</u> 881P - 1" thread, 5 3/4" shank 886P - 1" thread, 1 1/2" shank | To obtain experience. |
| <u>Hughes Brothers</u> 2775-A5-3/4, 1" thread, 5-3/4" shank | To obtain experience. |
| <u>Joslyn</u> J203Z, 1" thread, 5-3/4" shank J221Z, 1" thread, 1-1/2" shank J647Z, 1-3/8" thread, 7" shank J630Z, 1-3/8" thread, 1-3/4" shank | To obtain experience. |

Conditional List
g(1)
February 17, 2005

g - Crossarms, fiberglass

| <u>Manufacturer</u> | <u>Description</u> | <u>Conditions</u> |
|--|--------------------------|-----------------------|
| <u>Creative Utility Products</u> | | |
| <u>Braced Application</u> | | |
| CUP08-RUS-LTC-03 | 8' Type-3 Drill Pattern | To obtain experience. |
| CUP08-RUS-LTC-04 | 8' Type-4 Drill Pattern | |
| CUP10-RUS-LTC-05 | 10' Type-5 Drill Pattern | |
| CUP08-RUS-MTC-03 | 8' Type-3 Drill Pattern | |
| CUP08-RUS-MTC-04 | 8' Type-4 Drill Pattern | |
| CUP10-RUS-MTC-05 | 10' Type-5 Drill Pattern | |
| CUP08-RUS-HTC-03 | 8' Type-3 Drill Pattern | |
| CUP08-RUS-HTC-04 | 8' Type-4 Drill Pattern | |
| CUP10-RUS-HTC-05 | 10' Type-5 Drill Pattern | |
| <u>Geotek (PUP)</u> | | |
| <u>Braced Application</u> | | |
| T2000-96-03X | 8' Type-3 Drill Pattern | To obtain experience. |
| T2000-96-04X | 8' Type-4 Drill Pattern | |
| T2000-120-05X | 10' Type-5 Drill Pattern | |
| T3000-96-03X | 8' Type-3 Drill Pattern | |
| T3000-96-04X | 8' Type-4 Drill Pattern | |
| T3000-120-05X | 10' Type-5 Drill Pattern | |
| (X = color code) | | |
| <u>Braceless (Centermount) Application</u> | | |
| TB2000-96-03X | 8' Type-3 Drill Pattern | To obtain experience. |
| TB2000-96-04X | 8' Type-4 Drill Pattern | |
| TB2000-120-05X | 10' Type-5 Drill Pattern | |
| TB3000-96-03X | 8' Type-3 Drill Pattern | |
| TB3000-96-04X | 8' Type-4 Drill Pattern | |
| TB3000-120-05X | 10' Type-5 Drill Pattern | |
| (X = color code) | | |
| <u>MacLean Power Systems</u> | | |
| <u>Braced Application</u> | | |
| PX08REA003 | 8' Type-3 Drill Pattern | To obtain experience. |
| PX08REA004 | 8' Type-4 Drill Pattern | |
| PX10REA005 | 10' Type-5 Drill Pattern | |
| <u>Braceless (Centermount) Application</u> | | |
| PX08ST003 | 8' Type-3 Drill Pattern | To obtain experience. |
| PX08ST004 | 8' Type-4 Drill Pattern | |
| PX10ST005 | 10' Type-5 Drill Pattern | |

g - Crossarms, fiberglass

| <u>Manufacturer</u> | <u>Description</u> | <u>Conditions</u> |
|--|--------------------------|-----------------------|
| <u>Powertrusion International, Inc.</u> | | |
| <u>Braced Application</u> | | |
| PST08001NR03 | 8' Type-3 Drill Pattern | To obtain experience. |
| PST08001NR04 | 8' Type-4 Drill Pattern | |
| PST10001NR05 | 10' Type-5 Drill Pattern | |
| PHT08001NR03 | 8' Type-3 Drill Pattern | |
| PHT08001NR04 | 8' Type-4 Drill Pattern | |
| PHT10001NR05 | 10' Type-5 Drill Pattern | |
| <u>Braceless (Centermount) Application</u> | | |
| PST08001BR03 | 8' Type-3 Drill Pattern | To obtain experience. |
| PST08001BR04 | 8' Type-4 Drill Pattern | |
| PST10001BR05 | 10' Type-5 Drill Pattern | |
| PHT08001BR03 | 8' Type-3 Drill Pattern | |
| PHT08001BR04 | 8' Type-4 Drill Pattern | |
| PHT10001BR05 | 10' Type-5 Drill Pattern | |
| <u>Shakespeare</u> | | |
| LSC-REA-03-(X)** | 8' Type-3 Drill Pattern | To obtain experience. |
| LSC-REA-04-(X)** | 8' Type-4 Drill Pattern | |
| LSC-REA-05-(X)** | 10' Type-5 Drill Pattern | |
| (**X=2-gray color or 5-dark bronze color) | | |

Note: Gripping studs or teeth on clamp type crossarm pins (item f) should not be installed against the surface of the fiberglass crossarms.

h - Brace, crossarm, steel

Wherever item "h" is shown on a construction drawing, use a brace from page cu.

i - Bolt, carriage

Applicable Specification: ANSI C135.1, "Standard for Galvanized Steel Bolts and Nuts."

Applicable Sizes: 3/8 inch diameter, 3 through 6 inch length
 1/2 inch diameter, 3 through 6 inch length

The following manufacturers have shown compliance with the applicable specifications for carriage bolts.

Dixie Electrical Manufacturing Company
Hubbell (Chance)
Hughes Brothers
Joslyn Manufacturing Company
Kortick Manufacturing Company
MacLean (Continental)
The Rockford Bolt & Steel Company

j - Screw, lag

Applicable Specifications: ANSI C135.3 "Standard for Zinc Coated Ferrous Lag Screws"

Applicable Sizes: 1/2 inch diameter, 4 inch length
 1/2 inch diameter, 5 inch length
 5/8 inch diameter, 4 inch length
 5/8 inch diameter, 5 inch length

The following manufacturers have shown compliance with the applicable specifications for lag screws:

Dixie Electrical Manufacturing Company
Hubbell (Chance)
Joslyn Manufacturing Company
Kortick Manufacturing Company
MacLean (Continental)

k - Insulators, suspension

| ANSI Class Type | 52-9A Clevis | 52-1 Clevis | 52-4 Clevis | 52-3 Ball & Socket |
|--------------------|-----------------|----------------|----------------|-----------------------|
| Disc Diameter | 4-1/4" | 6" | 9" or 9-1/2" | 9" or 9-1/2" |
| M & E Rating, lbs. | 10,000 | 10,000 | 15,000 | 15,000 |
| Leakage | 6-3/4" | 7" | 11-1/2" | 11-1/2" |
| Flashover, kV: Dry | 60 | 60 | 80 | 80 |
| Flashover, kV: Wet | 30 | 30 | 50 | 50 |
| NOTES | (3) (4) | (3) (4) | (5) | (2) |

| Manufacturer | Catalog Number | | | |
|-------------------------|----------------|-------|--------|--------|
| Lapp | - | - | 9100 | 9000 |
| Locke | 16044 | 16583 | 15S410 | 15S409 |
| Sediver | CT-4R2-M | - | - | - |
| Victor Insulators, Inc. | 817 | 804 | - | - |

| ANSI Class Type | 52-3 Ball & Socket | 52-4 Clevis | 52-5 Ball & Socket | 52-6 Clevis |
|--------------------|-----------------------|----------------|-----------------------|----------------|
| Disc Diameter | 10" | 10" | 10" | 10" |
| M & E Rating, lbs. | 15,000 | 15,000 | 25,000 | 25,000 |
| Leakage | 11-1/2" | 11-1/2" | 11" | 11" |
| Flashover, kV: Dry | 80 | 80 | 80 | 80 |
| Flashover, kV: Wet | 50 | 50 | 50 | 50 |
| NOTES | (2) | (1) | (2) | - |

| Manufacturer | Catalog Number | | | |
|------------------------|----------------|--------|--------|--------|
| GEC Alsthom | - | 105452 | - | - |
| Lapp | 8200 | 8100 | 301425 | 2300 |
| Locke | - | 20S580 | - | 30S257 |
| Porcelain Prod. (Knox) | 81022 | 81012 | - | - |
| Sediver | - | CT-8R2 | - | - |

Notes:

- (1) Use two for 24.9/14.4 kV deadends.
- (2) To be used only on transmission lines.
- (3) To be used only on distribution lines.
- (4) Use two insulators for 12.5/7.2 kV deadends and three for 24.9/14.4 kV deadends.
- (5) Use two insulators for 24.9/14.4 kV deadends.

k - Insulator, suspension

| Manufacturer | Conditions |
|-------------------------------------|-----------------------|
| <u>Sediver</u> | |
| 10" suspension insulator | To obtain experience. |
| N-8R2 (ball & socket, 20,000 lbs.) | |
| CT-14R2 (clevis, 30,000 lbs.) | |
| N-14R2 (ball & socket, 30,000 lbs.) | |

Conditional List
k(2)
January 2005

k - Insulator, polymer distribution deadend

| Manufacturer | Conditions |
|-------------------------------------|---|
| <u>Dulmison</u> | |
| Distribution deadend | 1. To obtain experience. |
| H-15 kV-4 | 2. For use as deadends on distribution lines only. |
| H-25 kV-6 | 3. Not recommended for use in areas subject to contamination. |
| <u>GLP</u> | |
| DS-15 (15 kV) | 1. Same as (1) above. |
| DS-28 (25 kV) | 2. Same as (2) above. |
| | 3. Same as (3) above. |
| <u>Hubbell (Ohio Brass)</u> | |
| "Veri*Lite" | 1. Same as (1) above. |
| Type PDI-15 (15 kV) | 2. Same as (2) above. |
| Type PDI-25 (25 kV) | 3. Same as (3) above. |
| Type PDI-35 (35 kV) | |
| <u>K-Line</u> | |
| Distribution deadend | 1. Same as (1) above. |
| KL-15ASCTM (15 kV line-to-line) | 2. Same as (2) above. |
| KL-28ASCTM (25 kV line-to-line) | 3. Same as (3) above. |
| KL-35SCTM (35 kV line-to-line) | |
| <u>MacLean (Reliable)</u> | |
| DS-15G (15 kV) | 1. Same as (1) above. |
| DS-15M (15 kV) (metal end fittings) | 2. Same as (2) above. |
| DS-28G (25 kV) | 3. Same as (3) above. |
| DS-28M (25 kV) (metal end fittings) | |
| DS-35G (35 kV) | |
| DS-35M (35 kV) (metal end fittings) | |
| <u>Porcelain Products</u> | |
| Distribution deadend | 1. Same as (1) above. |
| PDEI-15, 15 kV | 2. Same as (2) above. |
| PDEI-25, 25 kV | 3. Same as (3) above. |

NOTE: When insulators from this page are used, adjust construction drawing material list quantities as necessary. Recommended maximum working load is 5,000 lbs.

k - Insulator, polymer distribution deadend

| Manufacturer | Conditions |
|--------------------------------|---|
| <u>Salisbury</u> | |
| Distribution deadend | 1. To obtain experience. |
| 9501 Series, 15 kV | 2. For use as deadends on distribution lines only. |
| 9502 Series, 25 kV | 3. Not recommended for use in areas subject to contamination. |
| 9501U-SI (silicone - 15 kV) | |
| 9502U-SI (silicone - 28 kV) | |
| 9503U-SI (silicone - 35 kV) | |
| 9502L-EP (EPDM - 28 kV) | |
| <u>Sediver</u> | |
| Distribution deadend | 1. Same as (1) above. |
| ODI-11-70-15 (15 kV) | 2. Same as (2) above. |
| ODI-15-70-28 (25 kV) | 3. Same as (3) above. |
| ODI-17-70-35 (35 kV) | |
| <u>Victor Insulators, Inc.</u> | |
| Distribution deadend | 1. Same as (1) above. |
| 8015 (15kV) | 2. Same as (2) above. |
| 8025 (25kV) | 3. Same as (3) above. |
| 8035 (35kV) | |
| 8215 (15kV) | |
| 8225 (25kV) | |
| 8235 (35kV) | |
| <u>Volt Tek</u> | |
| Distribution deadend | 1. Same as (1) above. |
| 1515-00 (15 kV) | 2. Same as (2) above. |
| 2515-00 (25 kV) | 3. Same as (3) above. |

NOTE: When insulators from this page are used, adjust construction drawing material list quantities as necessary. Recommended maximum working load is 5000 lbs.

I - Clamp, deadend

DISTRIBUTION

| <u>Copper 2 through 6</u> <u>CWC 4A through 8A</u> | | <u>ACSR (Aluminum Clamps)</u> | | | |
|---|--------------------|-------------------------------|------------|------------|----------------|
| | | <u>4/0 & 3/0</u> | <u>2/0</u> | <u>1/0</u> | <u>2&4</u> |
| - | Alcoa | 302 | 302 | 302 | 302 |
| 80500-2000 | Hubbell (Anderson) | PG-57N | PG46N | PG-46N | PG-46N |
| - | C & R | CR-20-90 | CR-10-90 | CR-10-90 | CR-10-90 |
| - | Lapp | 306120N | 306118N | 306118N | 306118N |
| - | MacLean (Bethea) | DA-20N | DA-15-N | DA-15-N | DA-15-N |

I - Deadend for steel strand (overhead ground wire)

TRANSMISSION

For high strength, extra high strength steel strand and aluminum clad steel strand

| <u>Manufacturer</u> | <u>High Strength Steel</u> | | <u>Aluminum-clad steel</u> | | | <u>Extra High Strength</u> | | |
|--|------------------------------|------------------------------|----------------------------|------------------------|------------------------|----------------------------|-----------------|-----------------|
| | <u>3/8"</u> | <u>7/16"</u> | <u>7 No. 9 AWG</u> | <u>7 No. 8 AWG</u> | <u>7 No. 7 AWG</u> | <u>5/16"</u> | <u>3/8"</u> | <u>7/16"</u> |
| <u>Compression Type</u> | | | | | | | | |
| Alcoa Burndy Hubbell (Fargo) | 4620.12 YTW375E 861255 | 4627.14 YTW438E 861430 | YTW7M9T 861225 | YTW7M8T 861227 | YTW7M7T 861430 | 861022 | 861225 | 861430 |
| <u>Formed Type*</u> | | | | | | | | |
| Helical Line Prod. Hubbell (Chance) | HG210-3/8 | HG211-7/16 | HG523-12.5M | HG525-16M 16M-AWTLG | HG528-20M 20M-AWTLG | HG209-5/16 | HG210-3/8 | HG211-7/16 |
| * Class B galvanizing. When overhead ground wire has Class C galvanizing, formed deadend should also have Class C galvanizing. | | | | | | | | |
| <u>Automatic Type</u> | | | | | | | | |
| Hubbell (Fargo) MacLean (Reliable) | GDE-302 5202 | GDE-303 5203 | GDE-302 5202 | GDE-302 5202 | GDE-303 5203 | GDE-301 5201 | GDE-302 5202 | GDE-303 5203 |
| <u>Clamp Type</u> | | | | | | | | |
| MacLean (Continental) | FQD-55-3LW | FQD-55-3-LW | | | | | | |
| Hubbell (Anderson) | SWDE-55N | SWDE-55N | | | | | | |
| MacLean (Bethea) | FD-550-N | | | | | | | |

I - Clamp, deadend

DISTRIBUTION

2-Bolt Straight Line, Aluminum Alloy*

| Manufacturer | Conditions |
|---|---|
| <u>Burndy</u> Aluminum alloy deadend Catalog No. CUW26RE-1 (#2-2/0 Str. Aluminum, #4-2/0 ACSR) | 1. To obtain experience. 2. Applications limited to replacements under hot line conditions. |
| <u>C & R Products</u> Catalog No. CRDE-10-180 (#4 - 2/0 ACSR) Catalog No. CRDE-20-180 (3/0 - 4/0 ACSR) | Same as above. |
| <u>Hubbell (Anderson)</u> Aluminum alloy deadend Catalog No. ADSO-88(#2-1/0 ACSR) Catalog No. ADS-48-N (2/0 ACSR) Catalog No. ADS-60-N (3/0 ACSR) | Same as above. |
| <u>Hubbell (Chance)</u> Aluminum alloy deadend Catalog No. SDF10A (4 through 4/0 ACSR) | Same as above. |
| <u>Hubbell (Fargo)</u> Aluminum alloy deadend Catalog No. GD-961A side opening keeper (No. 4 and No. 2 ACSR) Catalog No. GD-972A (2/0, 3/0, 4/0 ACSR) | Same as above. |
| <u>MacLean (Bethea)</u> Aluminum alloy deadend Catalog No. ASO-684-2 (1/0, 2/0, 3/0 ACSR) Catalog No. ASD-2-N (4-2/0 ACSR) Catalog No. ASD-34-N 3/0, 4/0 ACSR Catalog No. HD 50-57 (with side opening) (4-4/0 ACSR) | Same as above. |

*Straight line deadend clamps are applicable for urban construction where tensions are moderate and on lines often worked hot.

I - Clamp, deadend

DISTRIBUTION

(wedge type)

| Manufacturer | Conditions |
|--|-----------------------|
| <u>Hubbell (Fargo)</u> | |
| GDW-2010A (#4 - 2/0 ACSR) Bare Aluminum jaws | To obtain experience. |
| GDW-2010 (#4 – 2/0 Str Cu) Plated Aluminum jaws for use with copper conductor | |
| GDW-2040A (#4 – 4/0 ACSR) Bare Aluminum jaws | |
| GDW-2040 (#4 – 3/0 Str Cu) Plated Aluminum jaws for use with copper conductor | |
| GDW-556 (266.8 - 477 kcmil ACSR) | |

m - Clamp, suspension

2 BOLT - DISTRIBUTION

| | Copper & CWC | ACSR with Straight or Formed Armor Rods | | | |
|----------------------------|-----------------|---|---------|-----------|-----------|
| | | 4 | 2 | 1/0 & 2/0 | 3/0 & 4/0 |
| ABB | 6240 | 6241 | 6242 | 6243 | 6244 |
| Alcoa | - | - | - | - | HSU* |
| C & R Products | - | - | - | CRSC-1 | CRSC-2 |
| Dulmison | - | - | - | - | HSU* |
| Hubbell (Anderson) | MS-46-N | MS-60-N | MS-70-N | HAS-85-N | HAS-104-N |
| Hubbell (Chance) | FWG1 | FWG2 | FWG3 | FWG4 | - |
| Lapp | 305740N | 306027N | 306028N | 306029N | 306030N |
| MacLean (Bethea) | FS-46-N | GW-1-N | LS-0-N | LS-1-N | LS-2-N |
| MacLean (Continental) | FSC-46-N | FSC-60-N | SC-70-N | SC-85-N | SC-105-N |
| Preformed Line Products | - | - | - | - | AGS* |

*Accepted for larger sizes.

m - Clamp, Suspension

ANGLE - DISTRIBUTION
No. 2 & 4 ACSR
Plus Rods

2300
AAC-301 & 302
-
GD-907A
306092
AC-60
RALS-1

ABB
MacLean (Continental)
Hubbell (Anderson)
Hubbell (Chance)
Hubbell (Fargo)
Lapp
Line Hardware
MacLean (Bethea)

2-BOLT TRANSMISSION
For 3/8" Steel Overhead
Ground Wire

6240
FSC-46N
MS-46-N
FGW1
-
305740N
-

n - Bolt, double arming

Applicable Specification: ANSI C135.1, "Standard for Galvanized Steel Bolts and Nuts."

Applicable Sizes: 5/8 inch diameter, 12 inch through 24 inch length

3/4 inch diameter, 20 inch through 24 inch length

The following manufacturers have shown compliance with the applicable specifications for double arming bolts:

Dixie Electrical Manufacturing Company
Hubbell (Chance)
Hughes Brothers
* Joslyn Manufacturing Company
Kortick Manufacturing Company
MacLean (Continental)
Portland Bolt & Manufacturing Company
Steel City Bolt & Screw Co., Inc.

*"Static proof" designs available.

o - Bolt, eye, oval

Applicable Specification: ANSI C135.4, "Standards for Galvanized Ferrous Eye Bolts and Nuts for Overhead Line Construction."

Applicable Sizes: 5/8 inch diameter, 6 through 20 inch length

3/4 inch diameter, 8 through 20 inch length

The following manufacturers have shown compliance with the applicable specifications for oval eye bolts:

Berny's Forging Company
Dixie Electrical Manufacturing Company
* Joslyn Manufacturing Company
Kortick Manufacturing Company
MacLean (Continental)

*"Static proof" designs available.

Shoulder Eye Bolt
for Transmission Structures

3/4 inch diameter, 8 inch through 20 inch length

| | <u>Catalog Number</u> |
|---------|-----------------------|
| Joslyn | J9528 to J9540 |
| Kortick | K9558 to K2570 |

p - Connectors, distribution (Parallel Groove)

Applicable Specification: ANSI C119.4

ACSR to ACSR
To same size or smaller

Bare Conductor

| | <u>4/0 - 2/0</u> | <u>1/0</u> | <u>2</u> | <u>4</u> |
|--------------------|------------------|------------|------------|------------|
| Alcoa | - | 396.6 | 490.0 | 490.0 |
| Blackburn | PAE 4141-9 | PAE 2121-9 | PAE 2121-9 | PAE 2121-9 |
| Burndy | KVS28A | UCG25R | UC25R2R | UC25R2R |
| Connector Mfg. | APC-2/0 | APC-2/0 | APC-1/0 | APC-1/0 |
| Hubbell (Anderson) | LC-53A | LC-51C | LC-51A | LC-51A |
| Hubbell (Fargo) | GA-9040L | GA-9020L | GA-9002L | GA-9003L |
| MacLean (Reliable) | APG-3 | APG-2 | APG-1 | APG-1 |
| Penn-Union | PCAA-20BF | PCAA-15BF | PCAA-10BF | PCAA-10BF |

Over Armor Rods

| | <u>3/0</u> | <u>2/0</u> | <u>1/0</u> | <u>2</u> | <u>4</u> |
|--------------------|------------|------------|------------|----------|----------|
| Blackburn | - | - | PAA10 | PAA10 | PAA10 |
| Burndy | - | - | UC32R | UC32R | UC32R |
| Hubbell (Anderson) | LC-83A | LC-52C | LC-52C | LC-52C | LC-52C |
| Hubbell (Fargo) | GA-9843 | GA-9842 | GA-9041L | GA-9020L | GA-9020L |
| MacLean (Reliable) | - | - | 744AL | 600AL | 600AL |
| Penn-Union | - | - | ARC-12 | ARC-11 | ARC-14 |

p - Connectors, Distribution (Parallel Groove)

Applicable Specification: ANSI C119.4

ACSR to Copper or Copperweld-Copper

ACSR Size (Bare Conductor)

| | 3/0 | 2/0 | 1/0 | 2 | 4 |
|--------------------|----------|----------|----------|----------|----------|
| Alcoa | 197 | R193 | R193 | 195 | 195 |
| Blackburn | PAC7 | PAC7 | PAC345 | 2CA | 4CA |
| Hubbell (Anderson) | LC-811A | LC-811A | LC-522A | LC-511A | LC-511 |
| Hubbell (Fargo) | GA-9040L | GA-9040L | GA-9020L | GA-9002L | GA-9003L |
| MacLean (Reliable) | 600ALC | 555ALC | 438ALC | 438ALC | 438ALC |

ACSR Size (Over Armor Rods)

| | 3/0 | 2/0 | 1/0 | 2 | 4 |
|--------------------|----------|----------|----------|----------|----------|
| Alcoa | 201 | R197 | R197 | R197 | 199 |
| Blackburn | - | - | PAC7 | PAC7 | PAC7 |
| Hubbell (Anderson) | LC-833 | LC-833 | LC-811A | LC-811A | LC-811 |
| Hubbell (Fargo) | GA-9843C | GA-9842C | GA-9040L | GA-9020L | GA-9020L |
| MacLean (Reliable) | - | - | 744ALC | 600ALC | 600ALC |

p - Connector, Distribution

Applicable Specification: ANSI C119.4

Copper Type Conductors
Connections to same size or smaller

| | | <u>Bare Conductor</u> | | | | |
|-----------------------------|---------------------------------|-----------------------|------------|---------|---------|---------|
| Copperweld Copper Copper | | 2A 0x7 | 2x3 | 4A | 6A 4 | 8A 6 |
| (s) | Blackburn | 1/0H | 1H | 2H | 4H | 6H |
| (s) | Burndy | KS-25 | KS-23 | KS-23 | KS-20 | KS-17 |
| (s) | Dossert | DS-10-F | DS-6-F | DS-6-F | DS-3-F | DS-2-F |
| (s) | Greaves | - | A-8 | - | A-5 | A-3 |
| (s) | Homac | - | 1F | 2F | 4F | 6F |
| | Hubbell (Anderson) | DG-1/0 | DG-1 | DG-2 | DG-4 | DG-6 |
| | Hubbell (Fargo) | GC-5020 | GC-5002S | GC-5002 | GC-5004 | GC-5006 |
| (s) | ILSCO | IK-1/0 | IK-2 | IK-2 | IK-4 | IK-6 |
| (s) | Kearney/Cooper Power Systems | 118109 | 118109 | 118108 | 118104 | 118102 |
| (s) | Krueger & Hudepohl | UC58C-EV | - | - | - | - |
| (s) | Penn-Union Royal Switchgear | S1/0 1739 | S2 1739 | S3 - | S4 - | S6 - |

Over Armor Rods

| | | | | | | |
|-----|------------------------------|---------|---------|---------|----------|---------|
| | Burndy | KVS-31 | KVS-31 | KVS-28 | KVS-26 | KVS-26 |
| | Hubbell (Anderson) | K-5 | K-4 | K-4 | K-2 | K-2 |
| | Hubbell (Fargo) | GC-5035 | GC-5035 | GC-5040 | GC-5020S | GC-5020 |
| | ILSCO | IKB-350 | IKB-350 | IKB-4/0 | - | - |
| (s) | Kearney/Cooper Power Systems | 118112 | 118112 | 118111 | 118110 | 118110 |
| | Penn-Union | VT-4 | VT-3 | VT-3 | VT-2 | VT-1 |

(s)designates split bolt connectors

Long Connectors (Split Bolt)
Copper to Copper

| | 2 | 4 | 6 |
|------------------------------|---------|---------|---------|
| Blackburn | 2H3 | 4H3 | 6H3 |
| Burndy | KS-22-3 | KS-20-3 | KS-17-3 |
| Dossert | DS5-3 | DS3-3 | DS2-3 |
| Greaves | A-9 | A-6 | A-4 |
| Homac | - | 4F | 6F |
| Hubbell (Anderson) | C-2-L | C-4-L | C-6-L |
| Kearney/Cooper Power Systems | 118107 | 118105 | 118103 |
| Penn-Union | SEL-2 | SEL-4 | SEL-6 |

p - Connectors, Service (Parallel Groove)

Applicable Specification: ANSI C119.4
Aluminum-to-Aluminum
Solid or Stranded

| | No. 2 | No. 4 |
|--------------------|------------|------------|
| Alcoa | 490.0 | 490.0 |
| Blackburn | PAE 2121-9 | PAE 2121-9 |
| Burndy | UC25R2R | UC25R2R |
| Hubbell (Anderson) | LC-51A | LC-51A |
| Hubbell (Fargo) | GA-9002L | GA-9002L |
| MacLean (Reliable) | APG-1 | APG-1 |
| Penn-Union | PCAA-10BF | PCAA-10BF |

p - Connectors, Service (Parallel Groove)

Applicable Specification: ANSI C119.4
Aluminum-to-Copper
Solid or Stranded

| | <u>2 Al to 4 Cu</u> | <u>4 Al to 6 Cu</u> |
|--------------------|---------------------|---------------------|
| Blackburn | PAC345 | PAC345 |
| Hubbell (Anderson) | LC-511A | LC-511A |
| Hubbell (Fargo) | GA-9002L | GA-9002L |

p - Connectors, Service

Applicable Specification: ANSI C119.4
Copper-to-Copper
Solid or Stranded

| Manufacturer | No. 4 | No. 6 |
|--------------------|---------|---------|
| Blackburn | 4N | 6N |
| Burndy | KP4C | KP6C |
| Dossert | ES-4 | ES-6 |
| Hubbell (Anderson) | 4E | 6ES |
| Hubbell (Fargo) | GC-5004 | GC-5006 |
| IlSCO | SX-4 | SX-6 |
| Maclean (Reliable) | BVC-4 | BVC-6 |
| Penn-Union | SX-4 | SX-6 |
| Southport | SE-3 | SE-2 |

p - Connectors, Guy Bond (Parallel Groove)

Applicable Specification: ANSI C119.4

ACSR to Guy Strand

| | <u>2/0</u> | <u>1/0</u> | <u>2 & 4</u> |
|--------------------|------------|------------|------------------|
| Alcoa | 396.6 | 396.6 | 490.0 |
| Blackburn | PAE 2121-9 | PAE 2121-9 | PAE 2121-9 |
| Burndy | UC 28R | UCG25R | UCG25R |
| Dossert | AC103-LW | AC101-LW | AC100-LW |
| Hubbell (Anderson) | LC-52A-GP | LC-51C-GP | LC-51A-GP |
| Hubbell (Fargo) | GA-9040L | GA-9040L | GA-9040L |
| MacLean (Reliable) | 744AL | 555AL | 438AL |
| Penn-Union | ALC-15 | ALC-10 | PCA-010 |

Copper to Guy Strand

| | |
|------------------------------|--------------------------|
| AMP | C-LOK Series |
| Blackburn | K-1 |
| | 2HPW (1/4") |
| | 1/0 HPW (3/8") |
| Burndy | UC8W26L |
| C & R | CRJC-1 |
| Dossert | UDV 13-1-P |
| Galvan | K1 |
| Hubbell (Anderson) | LC-511A |
| Hubbell (Fargo) | GC-8040P |
| ILSCO | SK-3 (1/4") |
| | SK-1/0 (3/8") |
| Joslyn | J8300 |
| Kearney/Cooper Power Systems | 9968-1 |
| Krueger & Hudepohl | UC58B-EV |
| MacLean (Reliable) | 438ALC |
| Penn-Union | JC-1-AC |
| | (1/4", 3/8" guy strand) |
| | (1/0 strand copper max.) |

p - Connectors, Compression
Applicable Specification: ANSI C119.4

DISTRIBUTION

| | Aluminum to aluminum | Aluminum to copper | Copper to copper | Tap Connections (Al to Al, Al to Cu) |
|---------------------------------|---------------------------|---------------------------|--------------------------|---|
| Blackburn | Type WR | Type WR | Type CF-1 | Type WR |
| Burndy | "Hycrimp" (Type YH) | "Hycrimp" (Type YH) | "Crimpit" (Type YC-C) | "Cabelok Crimpit" (Type YP-U) |
| Homac | H Tap-OB&DB | H Tap-OB&DB | CC | H Tap-OB&DB |
| Hubbell (Anderson) | AC Series | AC Series | VCUC | VCP |
| Kearney/Cooper Power Systems | "Squeezeon" (Aluminum) | "Squeezeon" (Aluminum) | "Squeezeon" (Copper) | "Squeezeon" (Aluminum) |
| Penn-Union | "Press-On" (Aluminum) | "Press-On" (Aluminum) | "Press-On" (Copper) | "Penn-L-Tap" |

NOTE: These connectors are acceptable when installed using tools and dies in accordance with the connector manufacturer's recommendations.

p - Connectors, Compression
Applicable Specification: ANSI C119.4

SERVICE

| | Aluminum-to-Aluminum Aluminum-to-Copper | Copper-to-Copper |
|---------------------------------|--|------------------------------------|
| Blackburn | CS, KL ICS-1, IKL (Insulated) | - |
| Burndy | "Linkits" (Type YSU, YSD) "Insulink"(ES) | "Hysplice" (Types YDS-C, YDS-W) |
| Homac | "Shure Splicers" | - |
| Hubbell (Anderson) | VAUS | VHS |
| Kearney/Cooper Power Systems | "Serv-ens" | - |
| National Tel. Supply | "Nicopress" | - |
| Penn-Union | "Penn Sleeves" | - |

These connectors are furnished in a variety of sizes to fit all combinations of aluminum and copper service wire.

NOTE: These connectors are acceptable when installed using tools and dies in accordance with the connector manufacturer's recommendations.

p - Connectors, Transmission
Applicable Specification: ANSI C119.4

BOLTED TYPE

ACSR to ACSR
ACSR to Copper

Alcoa 580 Series

Burndy (ACSR to ACSR) UP-A, UP-R

When ordering these clamps specify size, stranding and material of both conductors.

COMPRESSION TYPE

ACSR to ACSR
Same Size

| Conductor Size | Alcoa | Blackburn | Burndy | Hubbell (Anderson) | Kearney/Cooper Power Systems |
|-------------------|----------------|-----------|--------|--------------------|---------------------------------|
| 1/0 | 5074.438 | RCJ10 | YCS25R | VPUS | OHR-1/0-61AJ |
| 2/0 | 5074.484 | RCJ20 | YCS26R | - | OHR-2/0-61AJ |
| 3/0 | 5075.547 | RCJ30 | YCS27R | Order | OHR-3/0-61AJ |
| 4/0 | 5075.609 | RCJ40 | YCS28R | by | OHR-4/0-61AJ |
| 266.8 kcmil | 5076 Order by | RCJ266M | YCS30R | Conductor | HR-266-267AJ |
| 336.4 kcmil | 5076 stranding | RCJ336M | YCS33R | Size | HR-336-267AJ |

ACSR to Copper

Alcoa 5070 Series
Burndy YCR-R-CA
Hubbell (Anderson) VPUS

(Order by conductor sizes)

NOTE: These connectors are acceptable when installed using tools and dies in accordance with the connector manufacturer's recommendations.

p - Connectors
(wedge type)

| Manufacturer | Aluminum-to-aluminum | Aluminum-to-copper | Copper-to-copper | Tap Connections (Al to Al ,Al to Cu) |
|-----------------------------|---------------------------|---------------------------|------------------------|---|
| AMP | AMPACT MINIWEDGE | AMPACT MINIWEDGE | AMPACT C-LOK Series | AMPACT MINIWEDGE |
| Burndy | WEJTAP | WEJTAP | WEJTAP | WEJTAP |
| Connector Products, Inc. | Aluminum Tap Connector | Aluminum Tap Connector | - | Aluminum Tap Connector |
| Homac | Power Tap | Power Tap | - | Power Tap |

p - Connectors

| Manufacturer | Conditions |
|--|---|
| <u>Blackburn</u> Bolted, insulated IPC 1102 (#2-1/0 run, #2 tap) IPC 4111 (1/0-4/0 run, #2-1/0 tap) IPC 4141 (1/0-4/0 run, 1/0-4/0 tap) | 1. For use on 600 volt maximum insulated conductors. 2. To be used only for connecting service drop conductors to service entrance conductors. 3. To obtain experience. |
| <u>Homac</u> *Compression, Insulated "Shure Splicers" Types Q1N and U1N | To obtain experience. |
| <u>Hubbell (Anderson)</u> *Compression al to al al to cu "Versa-Crimp" L tap. Parallel groove, aluminum LC-52C (1/0 - 6/1 ACSR over armor rods) LC-51C (1/0 - 6/1 ACSR) | To obtain experience. To obtain experience. |
| <u>Kupler</u> Bolted, insulated 130001 (#2-1/0 run, #2 tap) 130003 (1/0-4/0 run, #2-1/0 tap) 130004 (1/0-4/0 run, 1/0-4/0 tap) | 1. For use on 600 volt maximum insulated conductors. 2. To be used only for connecting service drop conductors to service entrance conductors. 3. To obtain experience. |
| <u>Penn Union</u> *Compression, Insulated Type PIK | To obtain experience. |
| <u>Utilco</u> Two bolt style, al to al Type PM | To obtain experience. |

*NOTE: These connectors are acceptable when installed with tools and dies in accordance with the connector manufacturer's recommendations.

q - Bolt, double upset

Applicable Specification: "RUS Specifications for Single and Double Upset Spool Bolts," D-5

| Diameter, inches Length, inches | <u>5/8 7</u> | <u>5/8 8</u> | <u>5/8 9</u> | <u>5/8 10</u> |
|------------------------------------|------------------|------------------|------------------|-------------------|
| Dixie | D7824 | D7826 | D7828 | D7830 |
| Hubbell (Chance) | - | 7826 | 7828 | 7830 |
| Joslyn | - | J2394 | J2395 | J2396 |
| Kortick | K4760 | K4761 | K4762 | K4763 |
| MacLean (Continental) | U31065 | U31067 | U31069 | U31071 |

s - Clevis, secondary swinging

Applicable Specifications: "RUS Specifications for Secondary Swinging Clevises," D-6

| Manufacturer | Clevis only* | Clevis with 1-3/4" groove spool | Clevis with 3" groove spool |
|-----------------------|--------------|------------------------------------|--------------------------------|
| Dixie | D0352 | - | - |
| Hubbell (Chance) | 0352 | 0352-C909-1032 | 0352-C909-1034 |
| Joslyn | J0322 | - | - |
| Kortick | K9259 | K9109 | K9149 |
| MacLean (Continental) | U32043 | U36043 | U32143 |

*Catalog Number does not include spool. See page cm for spool type insulators.

u - Deadend for galvanized steel or
aluminum-clad steel guy strand

3-Bolt Guy Clamp

| | <u>Light (1/2" bolts)</u> | <u>Heavy (5/8" bolts)*</u> |
|-----------------------|---------------------------|----------------------------|
| Almat | - | K162-4 |
| Dixie | D6450 | D6461 |
| Hubbell (Chance) | 6450 | 6461 |
| Joslyn | J930 | J931 |
| Kortick | K4124 | K4005 |
| MacLean (Continental) | U5273 | U5275 |

U-Bolt Guy Clamp

| | <u>Light (3/8" bolts)</u> | <u>Heavy (1/2" bolts)</u> |
|-----------------------|---------------------------|---------------------------|
| Hubbell (Chance) | GCU38C | - |
| Joslyn (Flagg) | PAX-64C | PAX-67C |
| MacLean (Continental) | GC-64C | GC-67C |

Offset Guy Clamp

| | <u>Light (1/2" bolts)</u> | <u>Heavy (5/8" bolts)</u> |
|------------------|---------------------------|---------------------------|
| Hubbell (Chance) | 6409 | 6410 |
| Joslyn | J926 | J927 |

*For use on transmission.

u - Deadend for galvanized steel guy strand

| Strand Size: | 1/4" | 9/32" | 5/16" | 3/8" | 7/16" |
|---------------------------------|-------------|--------------|--------------|-------------|--------------|
| <u>Automatic</u> | | | | | |
| <u>MacLean (Reliable)</u> | | | | | |
| Bail for thimble eye | 5100 | 5201 | 5201 | 5102 | 5103 |
| Bail for guy insulator | 5150 | 5251 | 5251 | 5152 | 5153 |
| <u>Formed Type</u> | | | | | |
| <u>Alcoa Conductor</u> | | | | | |
| <u>Accessories</u> | | | | | |
| For standard guy* | GYDEGB061 | GYDEGB071 | GYDEGB079 | GYDEGB091 | GYDEGB110 |
| <u>Dulmison</u> | | | | | |
| For standard guy* | SGG-0610 | SGG-710 | SGG-0790 | SGG-0915 | SGG-1105 |
| <u>Florida Wire & Cable</u> | | | | | |
| For standard guy* | FLA 1300 | FLA 1400 | FLA 1500 | FLA 1600 | FLA 1700 |
| <u>Helical Line Products</u> | | | | | |
| For standard guy* | HG-207-1/4" | HG-208-9/32" | HG-209-5/16" | HG-210-3/8" | HG-211-7/16" |
| <u>Hubbell (Chance)</u> | | | | | |
| For standard guy* | 1/4 CTLG | 9/32 CTLG | 5/16 CTLG | 3/8 CTLG | 7/16 CTLG |
| For wrapped guy | 1/4 GSC-C | 9/32 CTLG-C | 5/16 GSC-C | 3/8 GSC-C | 7/16 GSC-C |
| <u>Payer Industries</u> | | | | | |
| For standard guy* | 25-GNBS | - | 30-GNBS | 35-GNBS | 38-GNBS |
| <u>Preformed Line Products</u> | | | | | |
| For standard guy* | GDE-1104 | GDE-1105 | GDE-1106 | GDE-1107 | GDE-1108 |
| For wrapped guy | WGL-2100 | WGL-2101 | WGL-2102 | WGL-2103 | WGL-2104 |

*Class B galvanizing. When guy wire has Class C galvanizing, formed deadend should also have Class C galvanizing.

u - Deadend for aluminum clad steel guy strand

| Strand Size | 3#10 (4M) | 7#12 (6M) | 7#11 (8M) | 7#10 (10M) | 7X.110" (11.5M) | 7#9 (12.5M) | 7X.121" (14M) | 7#8 (16M) | 7X.148" (20M) |
|-------------|--------------|--------------|--------------|---------------|--------------------|----------------|------------------|--------------|------------------|
|-------------|--------------|--------------|--------------|---------------|--------------------|----------------|------------------|--------------|------------------|

Formed Type
Aluminum-Clad Steel Guy Strand

Alcoa Conductor
Accessories
For standard guy

| | | | | | | | | |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| GYDEAW055 | GYDEAW060 | GYDEAW068 | GYDEAW077 | GYDEAW082 | GYDEAW087 | GYDEAW090 | GYDEAW096 | GYDEAW112 |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|

Dulmison
For standard guy

| | | | | | | | | |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|
| AWGG 0555 | AWGG 0600 | AWGG 0685 | AWGG 0770 | AWGG 0825 | AWGG 0870 | AWGG 0905 | AWGG 0965 | AWGG1125 |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|

Helical Line Products
For standard guy

| | | | | | | | | |
|---|----------|----------|-----------|---|-------------|-----------|-----------|-----------|
| - | HG517-6M | HG519-8M | HG521-10M | - | HG523-12.5M | HG524-14M | HG525-16M | HG528-20M |
|---|----------|----------|-----------|---|-------------|-----------|-----------|-----------|

Hubbell (Chance)
For standard guy

| | | | | | | | | |
|---|----------|----------|-----------|---|-------------|---|---|---|
| - | 6M-AWTLG | 8M-AWTLG | 10M-AWTLG | - | 12.5M-AWTLG | - | - | - |
|---|----------|----------|-----------|---|-------------|---|---|---|

Preformed Line Products
For standard guy
For wrapped guy

| | | | | | | | | |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| AWDE-4108 | AWDE-4110 | AWDE-4113 | AWDE-4116 | AWDE-4118 | AWDE-4119 | AWDE-4120 | AWDE-4122 | AWDE-4126 |
| - | WGL-4110 | WGL-4113 | WGL-4116 | - | WGL-4120 | - | - | - |

Automatic
Aluminum-Clad Steel Guy Strand

| | | | | | | | | | |
|--------------------|---|---------|---------|---------|---|---------|---|---|---|
| Hubbell (Fargo) | - | GDE-300 | GDE-301 | GDE-301 | - | GDE-302 | - | - | - |
| MacLean (Reliable) | - | 5200 | 5201 | 5201 | - | 5202 | - | - | - |

v - Guy Attachment
for 5/8" bolt

| Type: | Formed Strap | Angle Bolt Eye | Guy Hook | Guy Hook* |
|-----------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| Maximum Working Load Rating | 23,130 N (5200 lbs.) | 23,130 N (5200 lbs.) | 23,130 N (5200 lbs.) | 37,800 N (8500 lbs.) |
| Dixie | D5004 | D0100 | DD-9460 | DD-9462 |
| Hubbell (Chance) | 5004 | 0100 | - | GH5 |
| Joslyn | J25164 | J6500 | J6555 J6556 | - |
| Joslyn (Flagg) | - | - | - | P151X |
| Kortick | K4035 K4047 | K3140 | - | - |
| Line Hardware | - | - | - | HGA-58C |
| MacLean (Bethea) | - | - | - | AG-5 |
| MacLean (Continental) | U31030 | U5531 | GAD | GAD-56-4 |
| Power Play Products | - | - | - | B58GH |
| Universal Electric | - | - | - | UGA-56C |

*This hook may be used in place of the wrapped guy arrangement in assemblies E3-2 and E3-3.

Pole Eye Plates
(5/8" Bolt)

| Type | Pole Eye Plate |
|--------------------------------|--------------------------|
| Maximum Working Load Rating | 37,800 N. (8500 lbs.) |
| Hubbell (Anderson) | GSP-05 |
| Joslyn (Flagg) | PX88 |
| Line Hardware | PGA-548 |
| MacLean (Bethea) | PE5-6A |
| MacLean (Continental) | PEP-66-45 |

v - Guy attachment

| Manufacturer | Conditions |
|---|---|
| <u>MacLean (Continental)</u> Pole Band, UCB-15E | To obtain experience. For distribution lines only and 10,000 lbs maximum loading. |
| <u>Hubbell (Chance)</u> Pole Band, with cone head bolt 6280, and guy clip 456 6276 (for 6" to 10" pole) 6277 (for 8" to 14" pole) | To obtain experience. For distribution lines only and 10,000 lbs maximum loading. |
| <u>Joslyn</u> Pole Band, with cone head bolt J-6281, and guy clip J-6275 J-6280 (for 6" to 10" pole) J-6270 (for 8" to 14" pole) | To obtain experience. For distribution lines only and 10,000 lbs maximum loading. |

w - Insulators, guy strain
(Fiber Reinforced Plastic)

| Ult. Strength, lbs. | 11,000 | 15,000 | 21,000 |
|------------------------------|---|--|------------------|
| <u>Dulmison</u> | HSI1-1P Series | HSI-2X Series | HSI3-2P Series |
| <u>EPAC</u> | CC Series | CC Series | CC Series |
| <u>Hubbell (Chance)</u> | - | GS-16 | GS-21 |
| <u>Hughes Brothers</u> | - | 692 Series | 694 Series |
| <u>Joslyn (Flagg)</u> | 150 Series | 150 Series | 210 Series |
| <u>K-Line</u> | - | - | KL Series |
| <u>MacLean (Continental)</u> | G-11 Series GAC 11 Series (for 5/16" guy strand) | G-15 Series GAC 15 Series (for 3/8" guy strand) | G-21 Series - |

x - Rod, anchor

Applicable Specification: ANSI C135.2, "Standards for Galvanized Ferrous Strand Eye Anchor Rods"

Applicable Sizes:

- Single guy: 5/8 inch diam. 6, 7 and 8 feet long
3/4 inch diam. 8, 9 and 10 feet long
1 inch diam. 9 and 10 feet long
- Double guy: 5/8 inch diam. 7 and 8 feet long
3/4 inch diam. 8, 9 and 10 feet long
1 inch diam. 9 and 10 feet long
- Single Guy: Drive: 5/8 inch diam. 7 and 8 feet long
3/4 inch diam. 8, 9 and 10 feet long
1 inch diam. 9 and 10 feet long
- Double Guy: Drive: 5/8 inch diam. 7 and 8 feet long
3/4 inch diam. 8, 9 and 10 feet long
1 inch diam. 9 and 10 feet long

The following manufacturers have shown compliance with the applicable specifications. Some manufacturers cannot supply all sizes listed above. Check with manufacturer or distributor for availability.

Dixie
Eritech (Carolina Galvanizing/Knight)
Grip-Tite
Hubbell (Chance)
Joslyn
Kortick
Utilities Service

Conditional List

x(1)
July 2004

x - Rod, anchor

Applicable Specification: ANSI C135.2 "Standards for Galvanized Ferrous Strand Eye Anchor Rods" except rods are copper covered. Copper coating thickness is 13 mil minimum at any point and a 15 mil average. All purchases should specify that a factory certification to the thickness of the copper must accompany the shipment of the rods.

Applicable Sizes: Double Guy - 3/4 inch diameter, 8 and 9 feet long.

| Manufacturer | Conditions |
|--------------|---|
| Joslyn | <ol style="list-style-type: none">1. To obtain experience.2. For transmission purposes only.3. For use with log anchors or copper covered plate anchors only.4. To be used with copper coated hardware or bronze hardware underground. |

y - Galvanized Steel Strand

Usage: Guy, Distribution or Transmission Line
Overhead Static Wire

ASTM Specification: A 475 - For Guy Strand
A 363 - For Overhead Static Wire

Following grades/diameters of steel wire strands are preferred sizes:

For Guying

| Siemens-Martin | High Strength | Extra High Strength Grade | |
|-------------------|-----------------|---------------------------|--------------|
| Distribution Line | Dist. or Trans. | Distribution | Transmission |
| 1/4" dia. | 1/4" dia. | 1/4" dia. | 1/4" dia. |
| 3/8" | 9/32" | 9/32" | 9/32" |
| 7/16" | 5/16" | 5/16" | 5/16" |
| | 3/8" | 3/8" | 3/8" |
| | 7/16" | | 7/16" |

For Overhead Static Wire (Groundwire)

| High Strength | Extra High Strength Grade |
|---------------|---------------------------|
| 3/8" dia. | 5/16" dia. |
| 7/16" | 3/8" |
| | 7/16" |

Alcan Cable
Armco Steel Corporation
Bekaert Steel Wire Corporation
Cal-Wire
Central de Herramientas, S.A. de C.V.
Davis-Walker
Florida Wire and Cable
Indiana Steel and Wire
National Strand Products
Paulsen Wire and Rope Corporation
Seal Wire Company
Southwire

Note: The buyer should specify Class A, B, or C coating per ASTM A363 or A475.

y - Steel Strand

Aluminum-Clad
Specifications: ASTM B415 and B416

For overhead groundwire

(Joint and splice requirements for wire and strand to meet ASTM A363)
AWG Sizes: (a) 7 No. 10, (c) 7 No. 9, (d) 7 No. 8, (e) 7 No. 7 AWG

| | |
|--------------------------|--------------------|
| Intral and Company, Ltd. | (a), (c), (d), (e) |
| Nehring - Conex | (a), (c), (d), (e) |
| United States Alumoweld | (a), (c), (d), (e) |

For guy strand

(M is rated breaking load in thousand lbs)

M Sizes: 6M (7 No. 12), 8M (7 No. 11), 10M (7 NO. 10), 11.5M (7 x .110"), 12.5M (7 No. 9),
14M (7 x .121"), 16M (7 No. 8), 18M (7 x .139"), 20M (7 x .148")

| | |
|-----------------------------------|-----------------------------------|
| Alumoclad de Mexico, S.A. de C.V. | 8M, 10M, 16M |
| Intral and Company, Ltd. | 6M, 8M, 10M, 12.5M, 16M, 18M, 20M |
| Nehring - Conex | 8M, 10M, 12.5M, 16M, 18M |
| United States Alumoweld | 6M, 8M, 10M, 12.5M, 14M, 20M |

y - Aluminum Coated Steel Wire
Applicable Specification ASTM A474

National Strand Products, 3/8"

Distribution Guy Strand

Siemens-Martin
High Strength
Extra High Strength

To obtain experience.

Transmission Guy Strand

High Strength
Extra High Strength

To obtain experience.

Overhead Static Wire

High Strength
Extra High Strength

1. To obtain experience.
2. Must meet the joint requirements of ASTM A363.

y - Zinc - 5% Aluminum - Mischmetal alloy (Zn-5Al-MM) - Coated
Steel Wire Strands
Applicable Specification ASTM A855

Bekaert Corporation

Type/Grade: Nominal diameter (7-wire strand), in.

(HS): 1/4", 5/16", 3/8", & 7/16".
(EHS): 1/4", 5/16", 3/8", & 7/16".

Conditions

Distribution Guy Strand
High Strength (HS)
Extra High Strength (EHS)

To obtain experience.

Transmission Guy Strand
High Strength (HS)
Extra High Strength (EHS)

To obtain experience.

Overhead Static Wire
High Strength (HS)
Extra High Strength (EHS)

1. To obtain experience.
2. Must meet the joint requirements of ASTM A363.

NOTE: Only available with Class C coating.

Indiana Steel & Wire Co.

Type/Grade: Nominal diameter (7-wire strand), in.

(S-M): 1/4", 3/8", & 7/16".
(HS): 1/4", 9/32", 5/16", 3/8", & 7/16".
(EHS): 1/4", 9/32", 5/16", 3/8", & 7/16".

Conditions

Distribution Guy Strand
Siemens-Martin (S-M)
High Strength (HS)
Extra High Strength (EHS)

To obtain experience.

Transmission Guy Strand
High Strength (HS)
Extra High Strength (EHS)

To obtain experience.

Overhead Static Wire
High Strength (HS)
Extra High Strength (EHS)

1. To obtain experience.
2. Must meet the joint requirements of ASTM A363.

NOTE: The buyer should specify Class A, B, or C coating.

z - Anchors, Expanding and Plate

DISTRIBUTION

| | | | | | |
|--|----------------|----------------|----------------------|----------------------|----------------------|
| Designated Maximum holding power-lbs. | | 6,000 | 8,000 | 10,000 | 12,000 |
| Min. Area (sq. in.) | | 90 | 100 | 120 | 135 |
| Rod Dia. (inches) | | 5/8 | 5/8 | 3/4 | 3/4 |
| Rod Length (feet) | | 7 | 7 | 8 | - |
| | <u>Type</u> | | | | |
| Dixie | 4 way Plate | D88100-G - | D88115-G D7502-G | D88135-G - | D88135-G D7504-G |
| Grip-Tite | 8 way | A322812G | A322812G | A322812G | A322812G |
| Hubbell (Chance) | 8 way | 88135 | 88135 | 88135 | 88135 |
| Joslyn | 8 way | - | J8115 | J8135 | J8135 |
| Line Hardware | 8 way | 8-100G | 8-115G | 8-135G | 8-135G |
| MacLean (Continental) | 8 way Plate | UC88100-G - | UC88115-G UC617-G | UC88135-G UC622-G | UC88135-G UC822-G |

NOTE: Where galvanized anchors are listed, the same anchors ungalvanized (black asphalt coated) are also acceptable.

z - Anchors, plate

Applicable Specification: "RUS Specification for Steel Plate Anchors," T-3

TRANSMISSION

Minimum Area 400 sq. in.

3/4" Galv. Rods

Grip-Tite
Hubbell (Chance)
Joslyn
Line Hardware

XP24 - 3/4 - G
X24 - 3/4
J3524 - 3/4
CP-24G

NOTE: Where galvanized anchors are listed, the same anchors ungalvanized (black asphalt coated) are also acceptable.

z - Anchors, Service

Designated Maximum Holding Power in Sand - 2500 lbs.

| | <u>Screw</u> | <u>Expanding</u> |
|--------------------------------|--------------|------------------|
| Dixie | D-6526 | - |
| Eritech (Carolina Galvanizing) | 86346606 | - |
| Grip-Tite | - | 322065G |
| Hubbell (Chance) | 6346 | 6870 |
| Joslyn | J6526W-CA | JO870 |
| Line Hardware | - | 8-70G |
| MacLean (Continental) | UC6346-G | UPL62-2.5-G |

z - Anchors, Swamp

DISTRIBUTION

| | <u>10" dia.</u> | <u>12" dia.</u> | <u>15" dia.</u> |
|-----------------------|-----------------|-----------------|-----------------|
| Dixie | D-6710-S | D-6713-S | D-6715-S |
| Foresight | - | MR-SR* | - |
| Hubbell (Chance) | 10150AS | 132AS | 152AS |
| MacLean (Continental) | UC10150A-G | UC122A-G | UC152A-G |

*Drive type anchor. Surface area meets or exceeds that of 12" diameter anchors.

NOTE: Where galvanized anchors are listed, the same anchors ungalvanized (black asphalt coated) are also acceptable.

z - Anchors, Rock

| Anchor Size - inches | Expanding Rock Anchors | | | Rock Guy Bolt |
|-----------------------|------------------------|---------|---------|---------------|
| | 1-3/4 | 1-3/4 | 1-3/4 | 1-3/4 |
| Rod Length - inches | 15 | 30 | 53 | 18 |
| Rod Diameter - inches | 3/4 | 3/4 | 3/4 | 1 |
| Almat | K148-15 | K148-30 | K148-53 | - |
| Hubbell (Chance) | R315 | R330 | R353 | - |
| Joslyn | J3436 | J3437 | J3438 | - |
| Kortick | K5503 | K5504 | K5505 | K2377 |
| MacLean (Continental) | UCR315 | UCR330 | UCR353 | U5003 |

z - Pole keys

| | |
|-----------------------|----------|
| Hubbell (Chance) | P-4817 |
| Joslyn | J-4817 |
| MacLean (Continental) | UCP-4817 |

z - Anchors, Power-installed screw

Manufacturer: Dixie Electrical Manufacturing Company
Multi-Helix Screw Anchors

| Working Load Categories | | | | |
|---------------------------|-------------------------|--------------------------|--------------------------|--------------------------|
| Soil Type | 35,600 N (8,000 lb.) | 53,400 N (12,000 lb.) | 71,000 N (16,000 lb.) | 89,000 N (20,000 lb.) |
| A1 (Soil Class 2) | D-6632 | D-6632 | D-6636 | D-6636 |
| | D-6636 | D-6636 | D-6637 | D-6637 |
| | D-6637 | D-6637 | D-6638 | D-6638 |
| A2 (Soil Class 3) | D-6632 | D-6632 | D-6636 | D-6637 |
| | D-6636 | D-6636 | D-6637 | D-6638 |
| | D-6637 | D-6637 | D-6638 | - |
| B (Soil Classes 4 & 5) | D-6632 | D-6636 | D-6636 | D-6638 |
| | D-6636 | D-6637 | D-6637 | - |
| | D-6637 | D-6638 | - | - |
| C (Soil Classes 6 & 7) | D-6636 | D-6637 | D-6638 | - |
| | D-6637 | - | - | - |

Manufacturer: Hubbell (A. B. Chance Company)
"SS" Multi Helix Anchors

| Working Load Categories | | | | |
|---------------------------|-------------------------|--------------------------|--------------------------|--------------------------|
| Soil Type | 35,600 N (8,000 lb.) | 53,400 N (12,000 lb.) | 71,000 N (16,000 lb.) | 89,000 N (20,000 lb.) |
| A1 (Soil Class 2) | 12642-AE | 12642-AE | 12642-AEJ | 12642-AEJ |
| | 12642-AEJ | 12642-AEJ | 12642-EJN | 12642-EJN |
| | 12642-EJN | 12642-EJN | 12642-EJNS | 12642-ENJNS |
| A2 (Soil Class 3) | 12642-AE | 12642-AE | 12642-AEJ | 12642-EJN |
| | 12642-AEJ | 12642-AEJ | 12642-EJN | 12642-EJNS |
| | 12642-EJN | 12642-EJN | 12642-EJNS | - |
| B (Soil Classes 4 & 5) | 12642-AE | 12642-AEJ | 12642-AEJ | 12642-EJNS |
| | 12642-AEJ | 12642-EJN | 12642-EJN | - |
| | 12642-EJN | - | 12642-EJNS | - |
| C (Soil Classes 6 & 7) | 12642-AEJ | 12642-EJN | 12642-EJNS | - |
| | 12642-EJN | - | - | - |

NOTES: 1. See RUS Specification T-10 for definitions and explanations.

2. Anchors in the 53,400 N (12,000 lb.) category or above for use on wood poles must be used with hardware commensurate with the working load. Hardware may provide for either single or multiple guy attachments to the anchor.

3. Anchors listed in a specific working load category and/or soil class may generally be used at lower working load categories and/or lower numerical soil classes.

z - Anchors, Power-installed screw

Manufacturer: Joslyn
"PS" Screw Anchors

| Working Load Categories | | | | |
|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|
| Soil Type | 35,600 N (8,000 lb.) | 53,400 N (12,000 lb.) | 71,000 N (16,000 lb.) | 89,000 N (20,000 lb.) |
| A1 | J23380ACA | J23380ACA | - | - |
| (Soil Class 2) | J23381ACA | J23381ACA | - | - |
| | J23383ACA | J23383ACA | - | - |
| A2 | J23380ACA | J23380ACA | J23381ACA | J23383ACA |
| (Soil Class 3) | J23381ACA | J23381ACA | J23383ACA | J29726ACA |
| | J23383ACA | J23383ACA | J29726ACA | - |
| B | J23380ACA | J23380ACA | J23381ACA | J29726ACA |
| (Soil Classes 4 & 5) | J23381ACA | J23383ACA | J23383ACA | - |
| | J23383ACA | - | J29726ACA | - |
| C | J23381ACA | J23383ACA | J29726ACA | - |
| (Soil Classes 6 & 7) | J23383ACA | - | - | - |

NOTES: 1. See RUS Specification T-10 for definitions and explanations.

2. Anchors in the 53,400 N (12,000 lb.) category or above for use on wood poles must be used with hardware commensurate with the working load. Hardware may provide for either single or multiple guy attachments to the anchor.

3. Anchors listed in a specific working load category and/or soil class may generally be used at lower working load categories and/or lower numerical soil classes.

z - Anchors

| Manufacturer | Conditions |
|--|--|
| <u>Bathurst</u> Screw anchors, power installed BMS-003 (6,000 lbs.) BMS-003R (5/8" rod) BMS-004 (10,000 lbs.) BMS-004R (3/4" rod) | To obtain experience. |
| <u>Dixie</u> Screw anchors, power installed D-1162-G (6,000 & 8,000 lb., 5/8" rod) D-1375-G (10,000 & 12,000 lb., 3/4" rod) | To obtain experience. |
| <u>Foresight</u> MR-1, MR-2, MR-3, MR-4 | 1. To obtain experience. 2. Each installation must be proof tested. Maximum rating is test value achieved. |
| <u>Hubbell (Chance)</u> Screw anchors, power installed 024462 (6,000 and 8,000 lb.) 12332P (5/8" rod) 12587 (5/8" thimbleye nut) 024484 (10,000 and 12,000 lb.) 12632P (3/4" rod) 6512 (3/4" thimbleye nut) | To obtain experience. |
| <u>Joslyn</u> Screw anchors, power- installed J11B-CA (6,000 & 8,000 lb., 5/8" rod) J13C-CA (10,000 & 12,000 lb., 3/4" rod) | To obtain experience. |

NOTES: Where galvanized anchors are listed, the same anchors ungalvanized (black asphalt coated) are also acceptable.

Catalog numbers shown for screw anchors are for anchors with 1-3/8" hubs. Equivalent anchors with 1-1/2" hubs are also acceptable. (A special installing wrench is required.)

aa, ab
July 2004

aa - Nut, eye
ab - Nut, thimble eye

| | aa | | ab | |
|-----------------------|----------------------|-------|-----------------|-------|
| | Eye Nut Conventional | | Thimble Eye Nut | |
| | 5/8" | 3/4" | 5/8" | 5/8" |
| Berny's Forging Co. | OE1 | - | - | - |
| Dixie | D6502 | - | DD-6517 | D6510 |
| Hubbell (Chance) | 6502 | - | B14A | 6510 |
| Hughes | EN60 | - | - | - |
| Joslyn | J1092 | J1093 | J1126 | J6510 |
| Kortick | K4212 | - | K4413 | K3111 |
| Line Hardware | OEN-58 | - | BEL-58 | - |
| MacLean (Continental) | EN-5 | - | BE-5 | TN-5 |

ac - Brace, sidearm diagonal

| | 1-1/2 inch angle 3/16" x 5' | 1-3/4 inch angle 3/16" x 7' |
|-----------------------|--------------------------------|--------------------------------|
| Hubbell (Chance) | - | 6984 |
| Joslyn | - | J1525 |
| Kortick | K1951 | K1954 |
| MacLean (Continental) | U5210 | U5212 |

ae - Surge (lightning) Arrester, Distribution Class

SiC Type

| Manufacturer | Type | Ratings, kV | Housing | Duty |
|------------------------------|---------|-------------|-----------|--------|
| ABB | LV | 9/10 | Porcelain | Normal |
| | LVBB | 9/10, 18 | Porcelain | Heavy |
| General Electric | Alugard | 9, 10, 18 | Porcelain | Heavy |
| Kearney/Cooper Power Systems | Unigap | 9, 10, 18 | Porcelain | Heavy |

MOV Type

| Manufacturer | Type | Ratings, kV | Housing | Duty |
|----------------------|--------------|---------------|-----------|-------|
| Cooper Power Systems | AZL VariSTAR | 9, 10, 18, 27 | Porcelain | Heavy |

ae - Surge (Lightning) Arresters, Substation*

| SiC Type | | | | |
|---------------------------------|---------|-----------------------|-----------|-------------------------------|
| Manufacturer | Type | Accepted Ratings - kV | Housing | Manufacturer's Classification |
| ABB | LV | 3-20 | Porcelain | Distribution |
| | IVL | 3-120 | Porcelain | Intermediate |
| | CPL | 3-312 | Porcelain | Station |
| General Electric | Alugard | 3, 9, 10, 18 | Porcelain | Distribution |
| Kearney/Cooper Power Systems | Unigap | 3, 9, 10, 18 | Porcelain | Distribution |

| MOV Type | | | | |
|---------------------------------------|---------|-----------------------|-----------|-------------------------------|
| Manufacturer | Type | Accepted Ratings - kV | Housing | Manufacturer's Classification |
| Hubbell Power Systems (Ohio Brass) | DynaVar | | | |
| | VLA | 3-27 | Porcelain | Station |
| | VL | 3-48 | Porcelain | Station |
| | VN | 54-312 | Porcelain | Station |

* For instructions concerning application at substations, refer to RUS Bulletin 1724E-300, "Guide for the Design of Substations for Electric Borrowers." In the purchase of arresters, care should be taken to select the type and voltage ratings in accordance with the line voltage and the type of construction (grounded or ungrounded).

ae - Surge (Lightning) Arresters, Distribution Class

CONDITION OF ACCEPTANCE: To Obtain Experience

| MOV Type | | | | |
|---------------------------------------|-------------------------------|-------------|-----------|--------|
| Manufacturer | Type | Ratings, kV | Housing | Duty |
| ABB | HMX | 9,10,18 | Porcelain | Heavy |
| | XPH | 9,10,18,27 | Polymer | Heavy |
| Cooper Power Systems | AZS VariSTAR | 9,10,18,27 | Porcelain | Normal |
| | UNS Ultra Sil Housed VariSTAR | 9,10,18,27 | Polymer | Normal |
| | UHS Ultra Sil Housed VariSTAR | 9,10,18,27 | Polymer | Heavy |
| | | | | |
| General Electric | Tranquell, 9L23 Series | 9,10,18,27 | Polymer | Heavy |
| Hubbell Power Systems (Ohio Brass) | DynaVar PDV-65 | 9,10,18,27 | Polymer | Normal |
| | DynaVar PDV-100 | 9,10,18,27 | Polymer | Heavy |
| Joslyn | ZNP | 9,10,18,27 | Polymer | Normal |
| | ZHP | 9,10,18,27 | Polymer | Heavy |
| Raychem Corporation | HDA Series | 9,10,18,27 | Polymer | Normal |

| MOV Type (Internally Gapped) | | | | |
|------------------------------|----------------------|-------------|-----------|--------|
| Manufacturer | Type | Ratings, kV | Housing | Duty |
| Cooper Power Systems | AZL500 VariGAP | 9,10,18,27 | Porcelain | Heavy |
| | CPS AZS500 VariGAP | 9,10,18,27 | Polymer | Normal |
| | UNG UltraSIL VariGAP | 9,10,18,27 | Polymer | Normal |
| | UHG UltraSIL VariGAP | 9,10,18,27 | Polymer | Heavy |

ae - Surge Arrester, Substation*

CONDITION OF ACCEPTANCE: To Obtain Experience

MOV Type

| Manufacturer | Type | Accepted Ratings - kV | Housing | Manufacturer's Classification |
|------------------------------------|------------------|-----------------------|-----------|------------------------------------|
| ABB | SMX-30 | 3-312 | Porcelain | Station |
| Cooper Power Systems | VariStar | 3-312 | Porcelain | Station |
| | VariStar AZF | 3-120 | Porcelain | Intermediate |
| | VariSTAR US | 120-140 | Polymer | Station – 5.6 kJ/kV ⁽¹⁾ |
| | VariSTAR UI | 3-108 | Polymer | Intermediate |
| | VariSTAR US | 3-108 | Polymer | Station - 3.4 kJ/kV ⁽¹⁾ |
| | VariSTAR US | 3-108 | Polymer | Station - 3.4 kJ/kV |
| | VariSTAR UH | 3-108 | Polymer | Station - 5.6 kJ/kV |
| | VariSTAR UH | 3-108 | Polymer | Station - 5.6 kJ/kV ⁽¹⁾ |
| | VariSTAR UH | 120-140 | Polymer | Station - 8.9 kJ/kV ⁽¹⁾ |
| | VariSTAR UX | 3-108 | Polymer | Station - 8.9 kJ/kV ⁽¹⁾ |
| General Electric | Tranquell | 2.7-612 | Porcelain | Station |
| | Tranquell | 3-120 | Porcelain | Intermediate |
| Hubbell Power Systems (Ohio Brass) | PVI-LP | 3-72 | Polymer | Intermediate |
| | PVIA | 3-72 | Polymer | Intermediate |
| | DynaVar Type PVI | 3-144 | Polymer | Intermediate |
| | DynaVar Type PVN | 3-228 | Polymer | Station |
| Joslyn | Type ZS | 3-240 | Porcelain | Station |
| | Type ZSH | 258-468 | Porcelain | Station |
| | Type ZIP | 3-120 | Polymer | Intermediate |
| | Type ZSP | 3-144 | Polymer | Station |
| MagneTek | ZSE-E2A | 3-39 | Porcelain | Station |
| | ZSE-E3A | 45-312 | Porcelain | Station |
| Siemens Power | 3EQ1 | 36-240 | Polymer | Station |
| | 3EQ4 | 96-444 | Polymer | Station |
| | 3EP2 | 12-384 | Porcelain | Station |
| | 3EP4 | 12-150 | Porcelain | Station |

*For instructions concerning application at substations refer to RUS Bulletin 1724E-300, "Design Guide for Rural Substations." In the purchase of arresters, care should be taken to select the type and voltage rating in accordance with the line voltage and the type of construction (grounded or ungrounded).

(1) Energy ratings based on single impulse ratings

af - Cutouts, Distribution, Open

| Manufacturer | Type | Voltage Rating |
|------------------------------|---------------|----------------|
| ABB | ICX | 15, 27 kV |
| | LBU-II | 15, 27 kV |
| Cooper Power Systems | S1 | 15, 27 kV |
| | L | 15, 27 kV |
| Hubbell (Chance) | C | 15, 27, 35 kV |
| | C (loadbreak) | 15, 27, 35 kV |
| Kearney/Cooper Power Systems | HX | 15, 27 kV |
| Power Line Hardware | DHC | 15, 27 kV |
| S & C Electric | XS | 15, 27 kV |
| Southern States | Series 66 | 15, 27 kV |
| | Series 70 | 15 kV |

NOTE: The buyer should specify the load rating, voltage rating, interrupting rating and required accessories.

Cutouts used on underground riser poles should be loadbreak type or have hooks for portable load interrupters.

af - Cutout, open-link fuse support

| Manufacturer | Mounting | 12.5/7.2 kV 50 amp. | 24.9/14.4 kV 50 amp. |
|------------------------------|----------|------------------------|-------------------------|
| Cooper Power Systems | Crossarm | FT1A2 | FT1A4 |
| | Bushing | FT10A3 | - |
| Kearney/Cooper Power Systems | Crossarm | 6484-55 | - |
| | Bushing | 6483-59 | - |

NOTE: The open link fuse supports listed above are fuse supports only and have no inherent interrupting capacity. They should be used with fuse links capable of interrupting at least 1200 amperes and for transformer protection only.

af - Power Fuses, Substation

| Manufacturer | Type | Voltage Rating (kV) |
|------------------------------|----------------------------------|---------------------|
| Eaton (Cutler-Hammer) | RDB (Boric acid, refillable) | 15-34.5 |
| | DBA (Boric acid, non-refillable) | 46-69 |
| | DBU (Boric acid, non-refillable) | 15-34.5 |
| Kearney/Cooper Power Systems | HX | 15 |
| | HX | 27 |
| S & C Electric* | SMD (Boric Acid) | 15-138 |
| Southern States | Series P | 15-161 |

*Available with porcelain insulators. Available with "Cypoxy" cycloaliphatic epoxy insulators 34.5 kV on request.

NOTE: All fuses listed on this page should be furnished with NEMA standard insulators. The buyer should specify the current rating, voltage rating, interrupting rating and required accessories.

Conditional List
af(1)
July 2004

af - Cutouts, Distribution, Open
with Linkbreak Attachment

| Manufacturer | Type | Voltage Rating | Conditions |
|------------------|------|-------------------|--|
| Hubbell (Chance) | C | 15, 27 kV | 1. To obtain experience. 2. Limited to 100 amp cutouts. 3. To be used only with Hubbell (Chance), Cooper and Kearney fuses. Will not break S&C and some other fuse types. |

ag - Fuses, Current Limiting, Backup

| Manufacturer | Conditions |
|---|--|
| <u>ABB</u> 15 kV Class Type CLTX, 25K/15T 25 kV Class Type CLTX, 25K/15T | 1. To obtain experience. 2. Must be used in series with external expulsion fuse 25K OR 15T or smaller or with CSP transformers 50 kVA or smaller. |
| <u>Cooper Power Systems</u> 15 kV Class FAH series 25 kV Class FAH series | Same as above. |
| <u>General Electric</u> 15 kV Class 9F59U Series 25 kV Class 9F59U | Same as above. |
| <u>High-Tech Fuses</u> 15 kV Class No. HTDE23 (X)025 25 kV Class No. HTDE24 (X)025 35 kV Class No. HTDE25 (X)025 | Same as above. |
| <u>Hubbell (Chance)</u> 15 kV Class Type K-Mate 25 Catalog No. C70L-31KA 25 kV Class Type K-Mate 25 Catalog No. C70L-32KA | Same as above. |

ah - Tie, insulator, formed type

| Manufacturer | Type |
|--------------------------------|--|
| <u>Dulmison</u> | LT "Longspan" top tie (Order for specific conductor size and insulator) ST side tie (Order for specific conductor size and insulator) Type SPL* (Side tie for use on spool insulator with 1-3/4" groove) DBST double side tie (Order for specific conductor size and insulator) DST double support tie (Order for specific conductor size and insulator) |
| <u>Helical Line Products</u> | HTT Series (Order for specific conductor size and insulator) |
| <u>Hubbell (Chance)</u> | Super Top-Tie, Type STT for single or double support use, with insulators 2-1/4" through 3-1/2" neck diameter and single support use on spool insulators with 1-3/4" groove diameter (Order for specific conductor size.) |
| <u>Preformed Line Products</u> | WT "Wraplock" (Order for specific conductor size and insulator) ST "Groove-Formed" side tie (Order for specific conductor size and insulator) Spool Tie for ACSR, Type SPL* (Side tie for use on spool insulator with 1-3/4" groove) DST double support top tie (Order for specific conductor size and insulator) DBST double side tie (Order for specific conductor size and insulator) |

*Not for side mounting on pin or post insulators.

ah - Tie, insulator, formed type

| Manufacturer | Conditions |
|--|-----------------------|
| <u>Dulmison</u> Type QSPL "Quick Spool" spool tie (Order for specific conductor size) | To obtain experience. |
| <u>Preformed Line Products</u> EZ-WRAP* spool tie (order for specific conductor size) | To obtain experience. |

*Not for side mounting on pin or post insulators.

ai - Rods, Ground

Applicable Size: The standard length is 8 feet and catalog numbers listed below are for this length. Longer rods may be required for special conditions.

Copper-covered ground rods are listed with a 13 mil minimum at any point and a 15 mil average covering of copper. All purchases should specify that a factory certification of the thickness of the copper must accompany the shipment of the rods.

Copper-covered steel rods

| | <u>5/8"</u> | <u>3/4"</u> |
|--|-------------|-------------|
| Alumoclad | AL- 588 | - |
| Apache | 588R | - |
| Blackburn | 625813MX | - |
| Boggs | EB-810-13 | - |
| Eritech (Carolina Galvanizing/Knight) | 615883 | - |
| Galvan | 6258G13 | - |
| Harger | 588RUS | - |
| Joslyn | J8338-13 | - |
| Korns | KCG588-13 | - |
| Republic Wire | RGC5883 | - |
| South Atlantic, LLC (Southern Grounding) | C58813 | C34813 |
| Wilcor | WA588C | - |

Stainless Clad Steel

| <u>Manufacturer</u> | <u>5/8"</u> | <u>3/4"</u> |
|---------------------|-------------|-------------|
|---------------------|-------------|-------------|

(None accepted at this time)

ai - Rods, Ground

Applicable Size: The standard length is 8 feet and catalog numbers listed below are for this length. Longer rods may be required for special conditions.

Hot Dip Galvanized Steel

| Manufacturer | 5/8" | 3/4" |
|--|-------------|-------------|
| Blackburn | - | GR7508 |
| Boggs | G588 | G348 |
| | PTG588** | PTG348** |
| Dixie | D8578 | D8618 |
| Erico | G588 | G348 |
| | G588PT** | G348PT** |
| Eritech (Carolina Galvanizing/Knight) | 815880 | 813480 |
| | 815889** | 813489** |
| Galvan | GR6258 | GR7508 |
| | GR6258P** | GR7508P** |
| General Electric | 0982-00002 | 0982-00003 |
| Grip-Tite | GT588 | GT348 |
| Hubbell (Chance) | 8578 | 8618 |
| | C203-0107** | C203-0109** |
| | C203-0377* | - |
| | GT588PT** | GT348PT** |
| Joslyn | J5328 | J5338 |
| Korns | KG58 | KG34 |
| Kortick | K4658 | K4678 |
| Line Hardware | GR-588G | GR-348G |
| Lloyd | 6258H | 7508H |
| MacLean (Continental) | U5307 | U6338 |
| Porcelain Products | 7338 | 7348 |
| South Atlantic, LLC (Southern Grounding) | Z588 | Z348 |
| Wilcor | WA8580G | WA8340G |

Electro-Galvanized Steel

| | | |
|-----------|----------|----------|
| Apache | G588 | G348 |
| | G588PT** | G348PT** |
| Blackburn | GR6258 | - |
| Calpico | G8580 | - |
| LMP | 6258E** | 7508E** |

Stainless Steel

| | | |
|--------|----------|---------|
| Galvan | S6258 | S7508 |
| Harger | 588SS3 | - |
| Wilcor | WA 588-S | WA348-S |

*Rod furnished with clamp.

**Rod furnished with 4 ft., No. 6 tinned or galvanized copper pigtail.

ai - Rods, ground, sectional

Galvanized steel and
copper-covered steel

Copper-covered ground rods are listed with a 13 mil minimum at any point and a 15 mil average covering of copper. All purchases should specify that a factory certification of the thickness of the copper must accompany the shipment of the rods. Rods are copper-covered unless marked galvanized steel.

Sectional Ground Rods

| Manufacturer | 8' long | 10' long | Coupling | Driving studs |
|---|-----------|-----------|----------------------|-----------------|
| Blackburn | 6258S13MX | 6260S13MX | 60C 60CNT2* | 60DS 60DSNT* |
| Demark Galv. Steel | - | - | GRC 58B* GRC 58G* | - |
| Eritech (Carolina Galv./Knight) | 635883 | 635803 | CR-58/CC-58* | DSH 58 |
| Galv. Steel | 835880 | 835800 | GC 58 | DSH 58 |
| Galv. Steel | 833480 | 833400 | - | DSH 34 |
| Galvan | - | - | GRC-58G** | - |
| | - | - | GRC-34G** | - |
| Galv. Steel | G25G13S | 6260G13S | 60-C | 60-DS |
| | - | - | 60-TC* | - |
| Hubbell (Chance) | | | | |
| Galv. Steel | C203-0052 | 8512 | 8611 | - |
| Joslyn | - | - | J9182 | J9186 |
| Galv. Steel | - | - | J23282A | - |
| South Atlantic, LLC (Southern Grounding) | CS58813 | CS581013 | - | - |
| | CS34813 | CS341013 | - | - |

* Threadless coupling or drive head

** Threadless coupling for galvanized rod

aj - Clamp, Ground Rod

| Manufacturer | For 5/8" Copper-Covered Rod | For 3/4" Galv.or Stainless Steel Rod | For 5/8" Galv.or Stainless Steel Rod |
|---------------------------------|-----------------------------|--------------------------------------|--------------------------------------|
| AMP | C-LOK Series | 81412-1 | 81412-1 |
| Blackburn | G5 | - | - |
| Boggs | G31 | - | - |
| Burndy | GRC58 | - | - |
| C & R Products | CRGC-58 | - | - |
| Connector Castings | G5 | - | - |
| Dossert | GNL62H | - | - |
| *Erico (Cadweld) | | | |
| 1 ground wire | GR1-161G | GR1-181G | GR1-161G |
| 2 ground wires | GT1-161G | GT1-181G | GT1-161G |
| Erico | EHL58C1T | - | EHL58G1T |
| | EHL58C1K | - | EHL58G1K |
| | EHL58C1G | - | EHL58G1G |
| Eritech (Carolina Galv./Knight) | CP 58 | UCSS | - |
| Galvan | G5 | - | - |
| Greaves/Mercury | G-580 | - | - |
| Hubbell (Anderson) | GC-5 | - | - |
| IlSCO | GRC-58 | - | - |
| Joslyn | J8392AB | J25985 | J25932 |
| Kortick | K4647 | - | - |
| Lew Electric Fittings | GRC-5/8" | - | - |
| Line Hardware | RC-58CE | - | - |
| Penn-Union | CEB-2 | CEB-3-TN | CEB-2-TN |
| MacLean (Reliable) | E58 | 3459 | 3459 |
| *Thermoweld | Type CR-1 | Type CR-1 | Type CR-1 |
| | M-2012 | M-2017 | M-2012 |
| Wilcor | HGR5/8 | WAU 5834-B | WAU 5834-B |

*Includes disposable molds.

Conditional List
aj(1)
July 2004

aj - Clamp, ground rod

| Manufacturer | Conditions |
|---|-----------------------|
| <u>Burndy</u> YGHP (for 5/8" copper-covered rods) | To obtain experience. |
| <u>DeMark</u> Copperhead (for 5/8" copper-covered, galvanized, and stainless rods) | To obtain experience. |
| <u>Line Hardware</u> RC-34 (for 5/8" and 3/4") galvanized or stainless steel ground rods | To obtain experience. |
| <u>Thomas & Betts</u> DGC58-44 (#4 copper ground wire) DGC58-66 (#6 copper ground wire) (for 5/8" copper-covered rods) | To obtain experience. |

al - Staples, ground wire

Applicable Specification: ANSI C135.14, "Standards for Staples with Rolled or Slash Points"

| Length x Spread (inches) | 1-1/2 x 1/4 | 2 x 1/2 | 1-1/2 x 3/8 | 3 x 1-1/16 |
|-----------------------------|------------------------|------------------------|--------------------------|-----------------|
| Diameter | 9 gauge Galv. Steel | 8 gauge Galv. Steel | 8 gauge Copper-Coated | 1/4 Moulding |
| Apollo | AP52I-S1672G | AP521-S1570 | AP501-S6652 | AP500-S6497 |
| Copperweld Southern | - | CP52 | - | - |
| FWC | FW1672G | FW157 | FW6652 | FW6497 |
| Hubbell (Chance) | C205-0247 | C205-0216 | 9167 | 9161 |
| Joslyn | J1672G | J157 | J6652 | J6497 |
| Kortick | - | - | K247 | K236 |
| Larson | - | 350453 | 750233 | 721312 |
| Lindsey | 10248 | - | - | 10270 |
| Redmore Products | SCSG1525148 | SDSG2050162 | SCCC1538162 | SDSG3090250 |
| MacLean (Continental) | U88 | U86 | U48 | U46 |

Barbed staples, ground wire

| Length x Spread (inches) | 1-1/2 x 3/8 | 2 x 5/8 | 1-1/2 x 3/8 | 3 x 1-1/16 |
|-----------------------------|---------------------|---------------------|-----------------------|---------------------|
| Diameter | .131 Galv. Steel | .165 Galv. Steel | .140 Copper-Coated | 7/32 Galv. Steel |
| Apollo | AP520-57488HTG | AP50I-S66525 | - | - |
| Joslyn | J7656 | J7672 | J7682 | J7664 |
| Redmore Products | - | TDSG2063187 | TCCC1538162 | TDSG3090250 |

Staples, alumoweld

| Length x Spread (inches) | 2 x 1/2 | 1-1/2 x 3/8 | 3 x 1-1/16 |
|-----------------------------|---------------|---------------|---------------|
| Diameter | 8 gauge | 8 gauge | 1/4 moulding |
| Apollo | AP531-S6655AL | AP531-S6652AL | AP530-S7493AL |
| Redmore Products | - | - | SDAA3090250 |

Clip, ground wire

Kearney/Cooper Power Systems 12326

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an - Transformers, distribution, pole type
Primary Voltages 7.2/12.5, 7.62/13.2 and 14.4/24.9 kV

Applicable Specifications: "RUS Specifications for Rural Distribution Transformers," D-10

Listing is by type rather than by catalog number because of the many possible combinations of voltage, kVA and taps and protective equipment.

| | 7.2/12.5 & 7.62/13.2 | 14.4/24.9 | Dual Voltage |
|---|-------------------------|-----------|-----------------|
| <u>ABB</u> | | | |
| Conventional, single bushing | S-B3 | S-B3 | S-B3 |
| Self-protected, single bushing | CSP-B3 | CSP-B3 | CSP-B3 |
| Conventional, two bushing | S-A | S-A | S-A |
| Type S-B3 may also be obtained with internal fuse, with internal fuse and double gap, and with lightning arrester and open link cutout (Type PC). | | | |
| <u>Arkansas Electric Cooperative</u> | | | |
| Conventional, single bushing | ASE | - | - |
| <u>Central Moloney</u> | | | |
| Conventional, single bushing | AOD | AOD | AOD |
| Conventional, two bushing | AOD | AOD | AOD |
| Self-protected, single bushing | DVP | DVP | DVP |
| The single bushing transformer may also be obtained with bushing mounted cutout and lightning arrester, and with internal fuse and double gap. | | | |
| <u>Cooper Power Systems¹</u> | | | |
| Conventional, single bushing* | REA-Conv | REA-Conv | REA-Conv |
| Self-protected, single bushing* | REA-CSP | REA-CSP | REA-CSP |
| Conventional, two bushing* | REA-Conv | REA-Conv | REA-Conv |

Conventional single bushing type may also be purchased with external overload protection and double gap and with bushing mounted cutout and lightning arrester.

*Cooper Envirottemp FR3 dielectric fluid is available as an option

Note:

1. Available with optional covers insulated for 15 KV dielectric strength at additional cost. (Transformer covers with higher electrical insulation, together with other coordinated electrical insulating protective measures, should help to significantly lessen shock and electrocution hazards to raptors, other birds, and small mammals.)

an - Transformers, distribution, pole type
Primary Voltages 7.2/12.5, 7.62/13.2 and 14.4/24.9 kV

| | 7.2/12.5 & 7.62/13.2 | 14.4/24.9 | Dual Voltage |
|--------------------------------|-------------------------|-----------|-----------------|
| <u>ERMCO</u> ¹ | | | |
| Conventional, single bushing | CONV | CONV | CONV |
| Conventional, two bushing | CONV | CONV | CONV |
| Self-protected, single bushing | CSP | CSP | CSP |

The single bushing transformer may also be obtained with double gap and internal fuse (Type DG) or lightning arrester and external cutout (Type COLA).

Dead-front for use in enclosure: Add "R" (Radial) or "LF" (Loop feed) to designation

Howard Industries

| | | | |
|--------------------------------|---------|---------|---------|
| Conventional, single bushing | REC-C | REC-C | REC-C |
| Conventional, two bushing | Conv-2B | Conv-2B | Conv-2B |
| Self-protected, single bushing | REC-P | REC-P | REC-P |

Kuhlman

| | | | |
|--------------------------------|---|---|---|
| Conventional, single bushing | I | I | I |
| Conventional, two bushing | B | B | B |
| Self-protected, single bushing | H | H | H |

Type I may also be purchased with internal fuse, with internal fuse and double gap (Type G), and with bushing mounted cutout and lightning arrester (Type J).

Note:

1. Available with optional covers insulated for 15 KV dielectric strength at additional cost. (Transformer covers with higher electrical insulation, together with other coordinated electrical insulating protective measures, should help to significantly lessen shock and electrocution hazards to raptors, other birds, and small mammals.)

an - Transformers, distribution, pole type
Primary Voltages 7.2/12.5, 7.62/13.2 and 14.4/24.9 kV

| | 7.2/12.5 & 7.62/13.2 | 14.4/24.9 | Dual Voltage |
|---|-------------------------|-----------|-----------------|
| <u>Magnetic Electric</u> | | | |
| Conventional, single bushing | AOD | AOD | AOD |
| Conventional, two bushing | AOD | AOD | AOD |
| Self-protected, single bushing | AOD | AOD | AOD |
| <u>Sesco</u> | | | |
| Conventional, single bushing | RU | - | - |
| Self-protected, single bushing | ESP | - | - |
| Conventional, two bushing | CONV | - | - |
| Type RU may also be purchased with internal fuse and/or lightning arrester. | | | |
| <u>United (Ky. AEC)</u> | | | |
| Conventional, single bushing | SC | SC | DSC |
| Conventional, two bushing | SC | SC | DSC |
| Self-protected, single bushing | SCP | SCP | DSCP |
| SC and DSC may be purchased with external fuse and arrester (SP and DSP) | | | |
| <u>VanTran</u> | | | |
| Conventional, single bushing | CR | - | - |
| Self-protected, single bushing | CSP-R | - | - |
| Conventional, two bushing | CD | - | - |

an-2
July 2004

an - Transformers, Power
Single-Phase, Step-Down for Distribution Substation Use

| Manufacturer | Primary Voltage - kV | Nominal OA Capacity (kVA) | |
|---|-------------------------|---------------------------|---------------|
| | | 167 - 833 | 1250 - 10,000 |
| <u>ABB</u> | 34.4 | X | X |
| | 43.8 | X | X |
| | 67.0 | X | X |
| | 115 | | X |
| <u>Central Moloney</u> | 34.4 | X | |
| <u>Cooper Power Systems*</u> | 34.4 | X | X |
| | 43.8 | X | X |
| <p>* Also available with optional Envirotemp FR3 fluid. Although Envirotemp FR3 fluid is a vegetable oil-based product, end-users are still subject to the federal oil pollution regulations under 40 CFR 112. End-Users should contact their appropriate local, state, or federal regulatory authority regarding the management, spills, and spent Envirotemp FR3 fluid.</p> | | | |
| <u>Kuhlman</u> | 34.4 | X | X |
| | 43.8 | X | X |
| | 67.0 | X | X |
| | 115 | | X |
| <u>Pennsylvania Transformer Technology, Inc.</u> | 34.4 | X | X |
| | 43.8 | X | X |
| | 67.0 | X | X |
| <u>Waukesha Electric Systems</u> | 34.4 | X | X |
| | 43.8 | X | X |
| | 67.0 | X | X |
| | 115 | | X |

All acceptances are based on RUS Specification S-3: Specifications for Step-Down Distribution Substation Transformers, and, 15 kV or 25 kV class secondary voltages.

115 kV and 138 kV transformers may have one step reduced BIL.

an - Transformers, Power
Three-Phase, Step-Down for Distribution Substation Use

| Manufacturer | Primary Voltage - kV | Nominal OA Capacity | |
|--------------|-------------------------|---------------------|-------------|
| | | 750 to 3750 kVA | 5 to 30 MVA |
| <u>ABB</u> | 34.4 | X | X |
| | 43.8 | X | X |
| | 67.0 | X | X |
| | 115 | | X |
| | 138 | | X |

Transformers 5 MVA and larger also accepted as load tap changing transformers using ABB Types UTS-A, UTT-B and UVW load tap changers.

| | | | |
|------------------------------|------|---|---|
| <u>Cooper Power Systems*</u> | 34.4 | X | X |
| | 43.8 | X | X |

* Also available with optional Envirottemp FR3 fluid. Although Envirottemp FR3 fluid is a vegetable oil-based product, end-users are still subject to the federal oil pollution regulations under 40 CFR 112. End-Users should contact their appropriate local, state, or federal regulatory authority regarding the management, spills, and spent Envirottemp FR3 fluid.

Transformers 5 MVA and larger also accepted as load tap changing transformers using Cooper Types 550, 550B and 550C load tap changers.

| | | | |
|----------------|------|---|---|
| <u>Kuhlman</u> | 34.4 | X | X |
| | 43.8 | X | X |
| | 67.0 | X | X |
| | 115 | | X |
| | 138 | | X |

Transformers 5 MVA and larger also accepted as load tap changing transformers using Siemens-Allis Types TLS and TLH load tap changers

| Manufacturer | Primary Voltage - kV | Nominal OA Capacity | |
|--|-------------------------|---------------------|-------------|
| | | 750 to 3750 kVA | 5 to 30 MVA |
| <u>Pennsylvania Transformer Technology, Inc.</u> | 34.4 | X | X |
| | 43.8 | X | X |
| | 67.0 | X | X |
| | 115 | | X |
| | 138 | | X |

Transformers 5 MVA and larger also accepted as load tap changing transformers using Cooper Types 550, 550B and 550C load tap changers.

| | | | |
|--------------------------------------|------|---|---|
| <u>Waukesha Electric Systems</u> | 34.4 | X | X |
| | 43.8 | X | X |
| | 67.0 | X | X |
| | 115 | X | X |
| | 138 | | X |

Transformers 5 MVA and larger also accepted as load tap changing transformers using ABB Type UZE; Reinhausen RMT-1; Reinhausen RMV-2; or Waukesha Electric Systems Type UZD load tap changers.

Notes:

All acceptances are based on RUS Specification S-3: Specifications for Step-Down Distribution Substation Transformers, and, 15 kV or 25 kV class secondary voltages.

115 kV and 138 kV transformers may have one step reduced BIL.

an - Transformers, Distribution, Pole Type

| Manufacturer | Conditions |
|--|-----------------------|
| <u>ABB</u> | |
| 7.2/12.5, 7.62/13.2 14.4/24.9 kV & Dual Voltage | |
| Single-phase, single bushing, 25 and 50 kVA pole type distribution transformers with amorphous metal cores. | To obtain experience. |
| Single-phase, single bushing and two-bushing with internal UMX Under-oil Arrester or with internal "Tranquell" Under-oil Arrester. | To obtain experience. |
| <u>Cooper Power Systems¹</u> | |
| 7.2/12.5, 7.62/13.2, 14.4/24.9 kV and Dual Voltage* | |
| Single-phase, single bushing, self-protected, with Magnex Interrupter | To obtain experience. |
| Above or Conventional, single or two bushing; Type REA Conv. or Self-protected, single bushing Type REA-CSP with Type AZU, MOV, heavy-duty under-oil arrester. | To obtain experience. |
| *Cooper Envirotemp FR3 dielectric fluid is available as an option | |
| <u>Ermco¹</u> | |
| 7.2/12.5 and 7.62/13.2 and 14.4/24.9 kV | |
| Single-phase, single bushing with internal Tranquell Under-oil Arrester | To obtain experience. |

Note:

1. Available with optional covers insulated for 15 KV dielectric strength at additional cost. (Transformer covers with higher electrical insulation, together with other coordinated electrical insulating protective measures, should help to significantly lessen shock and electrocution hazards to raptors, other birds, and small mammals.)

an - Transformers, Distribution, Pole Type

| Manufacturer | Conditions |
|--|-----------------------|
| <u>GE-Prolec</u> 12.47/7.2, 13.2/7.62, & 14.4/24.9 kV; 5 through 50 kVA Single bushing and two bushing Conventional & self-protected and 12.47/7.2 x 24.9/14.4 dual voltage | To obtain experience. |
| <u>Howard Industries</u> 7.2/12.5, 7.62/13.2, 14.4/24.9 kV and Dual Voltage | |
| Single-phase, single bushing, and two bushing with internal "AZU" or "Tranquell" under-oil arrester | To obtain experience. |
| Single-phase, single bushing, and two bushing; 5 - 50 kVA; with or without taps, with amorphous metal cores | To obtain experience. |
| <u>Kuhlman</u> 7.2/12.5 kV and 7.62/13.2 kV Toroform design 10, 15, & 25 kVA | To obtain experience. |
| <u>NECO</u> 7.2/12.5 kV and 14.4/24.9 kV Single-phase, two bushing, 10-50 kVA, Conventional | To obtain experience. |
| <u>VanTran</u> 14.4/24.9 kV and Dual Voltage | |
| Conventional, single bushing Type CR | To obtain experience. |
| Conventional, two bushing Type CD | To obtain experience. |
| Self-protected, single bushing Type CSP-R | To obtain experience. |

an - Transformers, Distribution, Pole Type
with non-porcelain secondary bushings

| <u>Manufacturer</u> | <u>Conditions</u> |
|---|-----------------------|
| <u>Cooper Power Systems</u> Fully or conditionally accepted with Central Moloney polymer secondary bushings | To obtain experience. |
| <u>ERMCO</u> ¹ Fully or conditionally accepted with Central Moloney polymer secondary bushings | To obtain experience. |
| <u>Howard Industries</u> Fully or conditionally accepted with Central Moloney polymer secondary bushings | To obtain experience. |
| <u>Kuhlman</u> Fully or conditionally accepted with Central Moloney polymer secondary bushings | To obtain experience. |
| <u>Magnetic Electric</u> Fully accepted with Central Moloney polymer secondary bushings | To obtain experience. |
| <u>United (Ky. AEC)</u> Fully accepted with Central Moloney polymer secondary bushings | To obtain experience. |

Note:

1. Available with optional covers insulated for 15 KV dielectric strength at additional cost. (Transformer covers with higher electrical insulation, together with other coordinated electrical insulating protective measures, should help to significantly lessen shock and electrocution hazards to raptors, other birds, and small mammals.)

an - Transformers, Power
Single-Phase, Step-Down
for Distribution Substation Use

Conditions for Acceptance: "E" - To obtain experience
"T" - Manufacturer to furnish RUS with satisfactory test results
(Only performance specifications have been submitted)

| Manufacturer | Primary Voltage - kV | Nominal OA Capacity (kVA) | |
|-------------------------------------|-------------------------|---------------------------|---------------|
| | | 167 - 833 | 1250 - 10,000 |
| <u>Delta-Star</u> | 34.4 | E | E |
| | 43.8 | E | E |
| | 67.0 | E | T |
| | 115 | - | T |
| <u>ESCO</u> | 34.4 | E | - |
| <u>Ferranti-Packard</u> | 67.0 | T | E |
| <u>Industrias IEM, S.A. de C.V.</u> | 67 | - | E |

All acceptances are based on RUS Specification S-3: Specifications for Step-Down Distribution Substation Transformers, and 15 kV or 25 kV class secondary voltages.

115 kV and 138 kV transformers may have one step reduced BIL.

an - Transformers, Power
Three-Phase, Step-Down
for Distribution Substation Use

Conditions for Acceptance: "E" - To obtain experience
"T" - Manufacturer to furnish RUS with satisfactory test results
(Only performance specifications have been submitted)

| Manufacturer | Primary Voltage - kV | Nominal OA Capacity | |
|-------------------|-------------------------|---------------------|-------------|
| | | 750 to 3750 kVA | 5 to 30 MVA |
| <u>Delta Star</u> | 34.4 | E | E |
| | 43.8 | E | E |
| | 67.0 | E | E |
| | 115 | - | E |
| | 138 | - | T |

Transformers 5 MVA and larger also accepted as load tap changing transformers using Seimens-Allis Types TLS and TLH-21 load tap changers.

| | | | |
|-------------------------|------|---|---|
| <u>Ferranti-Packard</u> | 34.4 | E | T |
| | 67.0 | T | E |
| | 115 | - | E |

| | | | |
|------------------|-----|---|---|
| <u>GE-Prolec</u> | 115 | - | E |
|------------------|-----|---|---|

Transformers 5 MVA and larger also accepted as load tap changing transformers using General Electric Types LR72, LR65, and LRT-200 load tap changers.

| | | | |
|---|-----|---|---|
| <u>Hyundai Heavy Industries Co., Ltd.</u> | 115 | - | E |
|---|-----|---|---|

Transformers 5 MVA and larger also accepted as load tap changing transformers using ABB type UZE and Reinhausen type RMV-II load tap changers.

| | | | |
|------------------------------------|-----|---|---|
| <u>Industrias IEM, S.A. de C.V</u> | 115 | - | E |
|------------------------------------|-----|---|---|

| | | | |
|------------|------|---|---|
| <u>MGM</u> | 34.4 | E | T |
| | 43.8 | E | T |
| | 67.0 | T | E |

Transformers 5 MVA and larger also accepted as load tap changing transformers using ABB Types UTS-A and UTT-B load tap changers.

| | | | |
|-----------------------------|------|---|---|
| <u>Pauwels Transformers</u> | 34.4 | - | E |
| | 67.0 | - | E |
| | 115 | - | E |

| | | | |
|------------------|------|---|---|
| <u>Uptegraff</u> | 34.4 | T | E |
| | 43.8 | T | E |

| | | | |
|-----------------------------|------|---|---|
| <u>Virginia Transformer</u> | 67.0 | - | E |
| | 115 | - | E |
| | 138 | - | E |

Transformers 5 MVA and larger also accepted as load tap changing transformers using ABB type UZE and Reinhausen type RMV-2 tap changers

an - Transformers, Power
Three-Phase, Step-Down
for Distribution Substation Use

Conditions for Acceptance: "E" - To obtain experience
"T" - Manufacturer to furnish RUS with satisfactory test results
(Only performance specifications have been submitted)

| | | | |
|-------------------------|------|---|---|
| <u>Voltran SA de CV</u> | 67.0 | - | E |
| | 115 | - | E |

Transformers 5 MVA and larger also accepted as load tap changing transformers using Reinhausen type RMV-II load tap changers.

All acceptances are based on RUS Specification S-3: Specifications for Step-Down Distribution Substation Transformers, and 15 kV or 25 kV class secondary voltages.

115 kV and 138 kV transformers may have one step reduced BIL.

an - Transformers, Step Ratio, Single Phase,
Autotransformers or Two-Winding Transformers
for Use in System Voltage Conversion

Condition of Acceptance: To obtain experience

| Manufacturer | Designation | Size |
|--|---------------------------|---------------------|
| <u>ABB</u> 2-WND | "Jumbo" | 167-500 |
| <u>Central Moloney</u> 2-WND | AOD | 167-500 |
| <u>Cooper Power Systems</u> 2-WND AUTO | "Round-Coil" MEPS-AUTO | 167-500 167-1000 |
| <u>Delta Star</u> 2-WND AUTO | LTD LTD-A | 167-500 167-1000 |
| <u>General Electric</u> 2-WND AUTO | HS STEP HS STEP | 167-500 167-1000 |
| <u>Howard Industries</u> 2-WND | STEPS | 167-500 |

NOTE: Two-winding transformers are self-protected under external short circuit in accordance with ANSI C57.12.90A. Auto-transformers will withstand 25 times rated current under external short circuit in accordance with ANSI C57.12.90A.

ao - Bolt, strand eye, straight (thimble eye)

Applicable Specification: ANSI C135.4, "Standards for
Galvanized Ferrous Eye Bolts
and Nuts for Overhead Line
Construction."

Applicable Sizes: 5/8 inch, 6 through 12 inch length 3/4
inch, 8 through 12 inch length

The following manufacturers have shown compliance with the applicable specification:

Dixie Electrical Manufacturing Company
Hubbell (Chance)
Joslyn Manufacturing Company
Kortick Manufacturing Company
MacLean (Continental)

ap-1
July 2004

ap - Clamp, hot line
Copper and Copperweld-copper Conductor
(Clamps with internal springs and enclosed threads)

| Conductor | |
|-------------------------|-------------------------------|
| Copper | 6 thru 2/0 |
| Copperweld-copper | 8A thru 2A |
| Blackburn | HLC 2108 |
| Electric Motion Company | EM HLC-101 |
| Hubbell (Anderson) | BC-2/0 |
| Hubbell (Chance) | S1520CC |
| Hubbell (Fargo) | GH-100S |
| | GH-201 (For use with CL Fuse) |
| Ideal | 3532 |
| MacLean (Reliable) | C1520 |
| Penn-Union | HLC-020-LS |

ap - Clamp, hot line
ACSR with armor rods

Clamps listed below have spring action and enclosed thread chambers.

| Conductor Size | | 4/0 & 3/0 | 2/0 | 1/0 & 2 | 4 |
|--------------------|--------------------|----------------------|----------------------|----------------------|----------------------|
| | Tap Conductor | | | | |
| Connector Mfg. | Aluminum | HL 4/0 | - | - | - |
| Hubbell (Anderson) | Aluminum Copper | AC-800 AC-800-GP | AH-4 AH-4-GP | AH-4 AH-4-GP | AH-4 AH-4-GP |
| Hubbell (Chance) | Aluminum Copper | S1540-AA S1540-AC | S1540-AA S1540-AC | S1530-AA S1530-AC | S1530-AA S1530-AC |
| Hubbell (Fargo) | Aluminum Copper | GH-202AL GH-102AC | GH-202AL GH-102AC | GH-101A GH-101AC | GH-101A GH-101AC |
| MacLean (Reliable) | Aluminum Copper | - - | - - | C1530A C1530A | C1530A C1530A |
| Penn Union | Aluminum Copper | - - | - - | HLCA-040 HLCA-040 | HLCA-040 HLCA-040 |
| Utilco | Aluminum | - | HLC-397 | - | HLC-40 |

ar - Wireholder

Applicable Specification: "RUS Specification for Service Wireholders," D-15

| | <u>With #22 Wood Screw</u> |
|--------------------|----------------------------|
| Blackburn | SW3 |
| Dixie | D3-11-44 |
| Hubbell (Chance) | 3-11-44 |
| Porcelain Products | 1986 |

NOTE: For triplex type service cable see clevis type wireholders on page bt-1.

Conditional List
ar(1)
July 2004

ar - Wireholder
(with #22 wood screw)

| Manufacturer | Conditions |
|--|-----------------------|
| <u>Hubbell Power Systems (Chance)</u> C207-0138 (nylon alloy) | To obtain experience. |
| <u>Joslyn</u> J089Z (nylon alloy) | To obtain experience. |

as - Clevis, service swinging

Applicable Specifications: "RUS Specifications for Service Swinging Clevises," D-7

| | <u>Clevis Only*</u> | <u>Clevis with Wet Process Spool</u> | <u>Clevis with Dry Process Spool</u> |
|-----------------------|---------------------|--------------------------------------|--|
| Dixie | D1938 | D1938-C | D1948-C |
| Hubbell (Chance) | 1948C | 1948C-C909-1031 | 1948C-0606 |
| Joslyn | J1614 | - | - |
| Kortick | K9260 | K9141 | K9142 |
| MacLean (Continental) | U32004 | U31003 | U31004 |

*Catalog number does not include spool; for spool insulators see Item cm.

at-1
July 2004

at - Guy Marker, 8 Foot Length

Steel

| <u>Manufacturer</u> | <u>Full Round</u> | <u>Half Round</u> |
|---------------------|-------------------|-------------------|
| Joslyn | J1618 | J1528 |
| Kortick | K3729 | - |

at - Guy Marker
8 Foot Length
Plastic or Fiberglass

| Manufacturer | Catalog Number |
|-------------------------|--|
| Auburn Extrusions | TK-808 (Yellow) (with bolt type clamp) |
| Custom Plastics | CPI-100XX-PVC Series |
| Dulmison | HGG-OL8Y-C (Yellow)* |
| Electrical Materials | 70-7 tie G (Gray)* 70-7 tie Y (Yellow)* 70-7 tie O (Orange)* 70-7 tie YORS (Yellow with Orange Stripes)* |
| Hubbell (Chance) | 96-PBG-2 (Gray) 96-PBG-2Y (Yellow) 96-PBG-2ORG (Orange) 96-FRPMR-GRY (Gray)* 96-FRPMR-YEL (Yellow)* 96-FRPMR-ORG (Orange)* 96-FRPMR-GRN (Green)* |
| Joslyn | J1491Y (Yellow) J1491G (Gray) J5518 (Yellow)* |
| Mangrum | R-8-Y |
| Osmose | OZ-25-18R (Yellow) |
| Preformed Line Products | PG-5508 (Gray)* PG-5518 (Yellow)* |
| Radar | 6032B (Yellow)* |
| Vaughn | 003-7140 (Gray)* 004-7140 (Yellow)* 005-7140 (White)* |
| Virginia Plastics | TG-137-8G (Gray)* TG-137-8Y (Yellow)* FG-8G (Gray)** FG-8Y (Yellow)** |

* For use with formed or automatic type deadends for guy strand; will not fit over bolt type guy clamps.

** Available with either 1 or 2 bolt clamps.

at-3
July 2004

at - Guy Marker
(Non-Flame Retardant)
8 Foot Length
Plastic or Fiberglass

| Manufacturer | Catalog Number |
|-------------------------|------------------------------------|
| Custom Plastics | CPI-100XX-PVC Series |
| Joslyn | J5718 (Yellow)* J1493Y (Yellow) |
| L. F. Manufacturing | MS-8-Y |
| Petroflex | P100-SDR17 Series |
| Preformed Line Products | PG (Poly) Series |
| R&M Plastics | GGY-TU-8 RMY GG-SM-8* |
| Radar Engineers | 6034 and 6036 |
| Virginia Plastics | TGP-16 PF |

*For use with formed or automatic type deadends for guy strand; will not fit over bolt type guy clamps.

at - Reflective Guy Marker, 8-foot length

Plastic or Fiberglass

| Manufacturer | Conditions |
|----------------------------------|-----------------------|
| * <u>Nordic</u> HG-815 yellow | To obtain experience. |

*For use with formed or automatic type deadends for guy strand; will not fit over bolt type guy clamps.

av - Conductor, ACSR

Applicable Specification: ASTM Specification B 232

Preferred Sizes:

| <u>Distribution</u> | <u>Transmission</u> |
|---------------------|---------------------|
| 4 - 6/1 | 1/0 - 6/1 |
| 4 - 7/1 | 2/0 - 6/1 |
| 2 - 6/1 | 3/0 - 6/1 |
| 2 - 7/1 | 4/0 - 6/1 |
| 1/0 - 6/1 | 266.8 kcmil - 26/7 |
| 2/0 - 6/1 | 336.4 kcmil - 26/7 |
| 3/0 - 6/1 | 477 kcmil - 26/7 |
| 4/0 - 6/1 | 556.5 kcmil - 26/7 |
| 266.8 kcmil 18/1 | 795 kcmil - 26/7 |
| 336.4 kcmil 18/1 | 954 kcmil - 54/7 |
| 477 kcmil 18/1 | |

NOTE: Larger sizes may be used where the engineer's study shows they are required.

The following manufacturers have shown compliance with the applicable specifications:

Alcan Cable
Conductores Monterrey S.A. de C.V.
Condumex
General Cable
Nehring
Nexans Canada
Nexans Korea
Noranda
Pirelli Cable
Southwire
Taihan Electric Wire

NOTES

1. Conductors with 18/1 stranding have different sag characteristics than conductors with 6/1 or 26/7 stranding. This difference in sag characteristics must be taken into consideration in the line design.
2. 266.8 kcmil 26/7, 336.4 kcmil 26/7, and 477 kcmil 26/7 may be used for distribution underbuild on transmission lines.

av - Conductor, copper

Applicable Specifications: ASTM Specification B1 for hard-drawn solid
ASTM Specification B8 for hard drawn stranded and soft stranded
ASTM Specification B3 for soft or annealed solid

Preferred Sizes: Hard-drawn solid - 4 and 6
Soft or annealed solid - 4 and 6
Hard-drawn stranded - 2x3, 1/0 x 7, 2/0 x 7
Soft stranded - 4 and 6

The following manufacturers have shown compliance with the applicable specifications:

Conductores Monterrey S.A. de C.V.

Condumex

General Cable

Hickory Wire, Inc.

Nehring

Republic Wire

Rome Cable

Seal Wire Company

Service Wire Company

Southwire

av - Conductor, Copper and Copper-clad steel

Applicable Specification: ASTM Specification B 229

| <u>Preferred Sizes</u> | |
|------------------------|---------------------|
| <u>Distribution</u> | <u>Transmission</u> |
| 8A | 1/0 F |
| 6A | 2/0 F |
| 4A | 3/0 F |
| 2A | 4/0 F |

The following manufacturers have shown compliance with the applicable specification for the sizes indicated:

Copperweld Southern
Southwire

(All sizes)
(2A and smaller)

av - Conductor, Service
(Single Conductor)

| Manufacturer | Aluminum | Copper |
|-----------------------|----------|--------|
| Alcan Cable | x | - |
| Conductores Monterrey | x | - |
| Condumex | x | x |
| General Cable | x | x |
| Nehring | x | - |
| Nexans Canada | x | - |
| Pirelli Cable | x | x |
| Rome Cable | x | x |
| Southwire | x | x |

Applicable Specification: ICEA-NEMA Standard S-66-524

Insulation: Cross-linked thermosetting polyethylene or equal.

Conductor: MHD copper or HD (Aluminum 1350) aluminum (Compact or compressed stranded conductor is acceptable.)

Marking: Manufacturer's name and type of insulation shall be clearly shown in durable markings on the surface of the insulation at intervals no greater than 24 inches.

av - Conductor, Service Cable
(Triplex and Quadruplex)

| <u>Manufacturer</u> | <u>Aluminum</u> | <u>Copper</u> |
|-----------------------|-----------------|---------------|
| Alcan Cable | x | - |
| Conductores Monterrey | x | - |
| Condumex | x | x |
| General Cable | x | x |
| Hendrix | x | x |
| Nehring | x | - |
| Nexans Canada | x | - |
| Pirelli Cable | x | x |
| Rome Cable | x | x |
| Service Wire | - | x |
| Southwire | x | x |

Applicable Specifications: RUS Specification D-2, Specifications for 600 Volt Neutral-Supported
Secondary Service Drop Cables.

av - Conductor, Aluminum Alloy

Applicable Specification: ASTM Specification B399

Preferred Sizes:

| DISTRIBUTION | | TRANSMISSION | |
|-----------------------|-------------|-------------------------|--------------|
| 6201 | ACSR Equiv. | 6201 | ACSR Equiv. |
| 48,690 cmil - 7 str.* | 4 | 123,300 cmil - 7 str.** | 1/0 |
| 77,470 cmil - 7 str.* | 2 | 155,400 cmil - 7 str.** | 2/0 |
| 123,300 cmil - 7 str. | 1/0 | 195,700 cmil - 7 str.** | 3/0 |
| 155,400 cmil - 7 str. | 2/0 | 246,900 cmil - 7 str. | 4/0 |
| 195,700 cmil - 7 str. | 3/0 | 312,800 cmil - 19 str. | 266,800 cmil |
| 246,900 cmil - 7 str. | 4/0 | 394,500 cmil - 19 str. | 336,400 cmil |
| | | 559,500 cmil - 19 str. | 477,000 cmil |
| | | 652,400 cmil - 19 str. | 556,500 cmil |
| | | 927,200 cmil - 37 str. | 795,000 cmil |

*Not recommended for multiphase lines with span lengths exceeding 300 ft.

**Not recommended for suspension type construction.

The following manufacturers have shown compliance with the applicable specifications:

| <u>Manufacturer</u> | <u>Type</u> |
|---------------------|-------------|
| Alcan | 6201 |
| General Cable | 6201 |
| Southwire | 6201 |

av - conductor

| Manufacturer | Conditions |
|--|---|
| <u>Alcan Cable</u> Duplex type, with ACSR or AAAC (6201) conductors using preferred conductor sizes. | 1. To obtain experience. 2. Conductor handling and installation shall be in accordance with manufacturer's recommendations. |
| <u>Copperweld Southern</u> Alumoweld-aluminum 6/1 ACSR/AW, 2, 1/0, 2/0, 4/0 4/3 AWAC, 4, 2, 1/0 | 1. To obtain experience. |
| <u>General Cable</u> T-2 type, with ACSR or AAAC (6201) conductors using preferred conductor sizes. | 1. To obtain experience. 2. Conductor handling and installation shall be in accordance with manufacturer's recommendations. |
| ACSR/TW, ACSS or ACSS/TW conductors using preferred conductor sizes. | 1. To obtain experience. 2. Conductor handling and installation shall be in accordance with manufacturer's recommendations. 3. Indicate type of steel core wire and class (if applicable) of coating. |
| <u>Nexans Canada</u> ACSR-II (T-2) type, with ACSR conductors using preferred conductor sizes | 1. To obtain experience. 2. Conductor handling and installation shall be in accordance with manufacturer's recommendations. |
| <u>Southwire</u> VR type, with ACSR or AAAC (6201) conductors using preferred conductor sizes. | 1. To obtain experience. 2. Conductor handling and installation shall be in accordance with manufacturer's recommendations. |

av – covered tap wire
(for use as primary jumpers)

| Manufacturer | Conditions |
|------------------------------|--------------------------|
| <u>Hendrix</u> TW#2, TW#4 | 1. To obtain experience. |

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aw - Washer, Spring

1/4" x 1-3/4" x 3-1/2"

| Manufacturer | Bolt Size | | |
|------------------|-----------|--------|--------|
| | 5/8" | 3/4" | 7/8" |
| Hubbell (Chance) | 3540 | 3541 | - |
| Joslyn | J3540 | J3541 | J3542 |
| Kortick | K2909 | - | - |
| Line Hardware | SCW-58 | SCW-34 | SCW-78 |

ax - Cutout and Arrester, Combination

ax-1
July 2004

| Nominal System Voltage | | For 12.5Y/7.2 kV | | For 13.2Y/7.6 kV | | For 24.9Y/14.4 kV | |
|---------------------------------|---|------------------|-----------------------------------|-----------------------------------|-------------|-----------------------------------|---------------------------------------|
| Cutout Max. Voltage Rating | | 7.8 kV | 15 kV | 15 kV | 18 kV | 27 kV | |
| Application | | 1ø Trans. | 1ø Sect. | 3ø Bank 3ø Sect. | 1ø Trans. | 1ø Sect. | 3ø Bank 3ø Sect. |
| Cutout Current Rating | | 50* | 100 | 100 | 50* | 100 | 100 |
| Manufacturer | Type Mounting | Catalog Numbers | | | | | |
| ABB | Crossarm Crossarm (L) | | 7.8 NCX/9 LVG 7.8 LBU-II/9 LVG | 15 NCX/10 LVG 15 LBU-II/10 LVG | | 15 NCX/10 LVG 15 LBU-II/10 LVG | 24.9 NCX/18 LVG 24.9 LBU-II/18 LVG |
| Cooper | Crossarm (L) Transformer Crossarm | AFZS110M010 | AFZS510B Series L4A1P1A00-BDOA | AFZS510C Series L4A1P1A00-BDOA | AFZS110M010 | AFZS510C Series L4A1P1A00-BDOA | AFZS518D Series L9CAP1A00-BGOA |
| Hubbell (Chance) | Crossarm Transformer | | C7 Series | C7 Series | | C7 Series | C7 Series |
| Kearney/Cooper Power Systems | Crossarm Transformer | | | KE3AB110E-110 | | KE4AB110E-110 | KE7BD109E-110 |
| | | 294072 | | | 294073 | | 294074 |

Either normal duty or heavy duty distribution class arresters listed on page ae-1 are acceptable for use with these combination units.

*These cutouts have open links and must not be used where fault currents are high or for sectionalizing.

(L) Indicates loadbreak type is available.

az - Pole Numbers and Letters, Metal

(See Drawing M52-3)

| Manufacturer | Catalog No. |
|--------------------------|-----------------------------------|
| Almetek Industries, Inc. | "E-Z Tags" - Order by description |
| Premax Products | 1523 |
| Tech Products | Everlast Tag |

ba-1
July 2004

ba - Bolt, Angle Eye

Thimble Type

Applicable Specification: ANSI C135.4, "Standards for Galvanized Ferrous Eye Bolts and Nuts for Overhead Line Construction"

Applicable Sizes : 5/8 inch, 6 through 12 inch length
3/4 inch, 8 through 12 inch length

The following manufacturers have shown compliance with the applicable specifications:

Dixie Electrical Manufacturing Company
Hubbell (Chance)
Joslyn Mfg. and Supply Company
Kortick Manufacturing Company
MacLean (Continental)

bb - Brace, sidearm vertical

| | <u>26" brace 24" bolt-hole spacing</u> | <u>50" brace 24" bolt-hole spacing</u> |
|-----------------------|--|--|
| Dixie | D6986 | D6987 |
| Kortick | K1931 | K1932 |
| MacLean (Continental) | U5249 | U5250 |

be-1
July 2004

be - Reclosers, oil and vacuum

| Mfr | Phases | Type | Circuit Voltage | Continuous Rating | Int. Rating | Oil/ Vacuum | Hydraulic/ Electronic |
|-------------------------------------|--|-------------------|-----------------|-------------------|-------------|----------------|--------------------------|
| Cooper | 1 | H | 12.5/7.2 | 5-50 | 1250 | O | H |
| | 1 | 4H | 12.5/7.2 | 5-100 | 2000 | O | H |
| | 1 | L | 12.5/7.2 | 25-100 | 4000 | O | H |
| | 3 | 6H | 12.5/7.2 | 5-100 | 2000 | O | H |
| | 3 | W | 12.5/7.2 | 100-560 | 10,000 | O | H |
| | 3 | WE | 12.5/7.2 | 560 | 10,000 | O | H |
| | 3 | VSA-12 | 12.5/7.2 | 100-560 | 12,000 | V | E |
| | 1 | E | 24.9/14.4 | 5-100 | 2500 | O | H |
| | (Type E available with shunt lockout solenoid for three-phase operation) | | | | | | |
| | 1 | 4E | 24.9/14.4 | 50-200 | 4000 | O | H |
| Lexington Switch and Controls | 3 | WV | 34.5/19.9 | 560 | 8000 | O | H |
| | 3 | WVE | 34.5/19.9 | 560 | 8000 | O | E |
| | 1 | A Line Model B | 12.5/7.2 | 5-50 | 1250 | O | H |
| | 1 | A Line Model D | 12.5/7.2 | 25-100 | 2000 | O | H |
| | 1 | A Line Model K | 12.5/7.2 | 25-100 | 4000 | O | H |

NOTES:

1. Series trip reclosers with ratings greater than 100 amp for 12.5/7.2 kV application, greater than 200 amp for 24.9/14.4 kV application, and 280 amp for 34.5/19.9 kV application are acceptable only with ground trip device. Shunt trip reclosers without ground trip devices may not be used with trip settings higher than 200 amp for 12.5/7.2 kV application, greater than 400 amp for 24.9/14.4 kV application, and 560 amp for 34.5/19.9 kV application.
2. Reclosers are not acceptable with load current, bushing CT battery chargers.

be - Recloser, oil circuit
12.5/7.2 kV

| Manufacturer | Conditions |
|--|-----------------------|
| <u>ABB</u> | |
| Three phase oil circuit recloser (Shunt trip with static or relay type controls) | |
| Type ES-400 (15-400 amperes) | To obtain experience. |
| Type ES-560 (15-560 amperes) | |
| Type ESM-560 (100-560 amperes) | |
| Type ES-105 (15-560 amperes) | |
| <u>Cooper Power Systems</u> | |
| Single phase, Type D rated 100 amperes continuous, 10,000 amperes symmetrical | To obtain experience. |
| <u>Lexington Switch and Controls</u> | |
| Three phase oil circuit recloser, 50,100 and 280 ampere frames. | To obtain experience. |
| A Line, Model 3B (5-50 amperes) | |
| Model 3D (5-100 amperes) | |
| Model 3K (25-280 amperes) | |

24.9/14.4 kV

| | |
|--|-----------------------|
| <u>Lexington Switch and Controls</u> | |
| Oil circuit recloser, | To obtain experience. |
| Single phase-A Line, Model M rated 100 amperes | |
| Three phase-A Line, Model 3M rated 100 amperes | |

34.5/19.9 kV

| | |
|---|-----------------------|
| <u>Cooper Power Systems</u> | |
| Single phase, Type DV rated 100-280 amperes continuous, 8,000 amperes symmetrical | To obtain experience. |

NOTES:

1. Series trip reclosers with ratings greater than 100 amp for 12.5/7.2 kV application, greater than 200 amp for 24.9/14.4 kV application, and 280 amp for 34.5/19.9 kV application are acceptable only with ground trip device. Shunt trip reclosers without ground trip devices may not be used with trip settings higher than 200 amp for 12.5/7.2 kV application, greater than 400 amp for 24.9/14.4 kV application, and 560 amp for 34.5/19.9 kV application.
2. Reclosers are not acceptable with load current, bushing CT battery chargers.

be - Reclosers, vacuum interrupter

| Manufacturer | Conditions |
|--|-----------------------|
| <u>ABB</u> | |
| Three phase Type ESVA rated 560/800 amps continuous, 12,000 amps symmetrical, maximum voltage 15.5 kV for 12.5/7.2 kV | To obtain experience. |
| Three phase Type ESMVA rated 560 amps continuous, 16,000 amps symmetrical, maximum voltage 15.5 kV for 12.5/7.2 kV | To obtain experience. |
| Three phase Type ESV rated 800 amps continuous, maximum voltage 38 kV 24.9/14.4 kV | To obtain experience. |
| <u>Cooper Power Systems</u> | |
| Single phase, Type V4H rated 5-100 amperes continuous, 2,000 amperes symmetrical, maximum voltage 15.5 kV for 12.5/7.2 and 13.2/7.62 kV | To obtain experience. |
| Single phase, Type V4L rated 50-100 amperes continuous, 6,000 amperes symmetrical, maximum voltage 15.5 kV for 12.5/7.2 and 13.2/7.62 kV | To obtain experience. |
| Three phase, Type V6H rated 5-100 amperes continuous, 2,000 amperes symmetrical, maximum voltage 15.5 kV for 12.5/7.2 and 13.2/7.62 kV | To obtain experience. |

NOTES:

1. Series trip reclosers with ratings greater than 100 amp for 12.5/7.2 kV application, greater than 200 amp for 24.9/14.4 kV application, and 280 amp for 34.5/19.9 kV application are acceptable only with ground trip device. Shunt trip reclosers without ground trip devices may not be used with trip settings higher than 200 amp for 12.5/7.2 kV application, greater than 400 amp for 24.9/14.4 kV application, and 560 amp for 34.5/19.9 kV application.
2. Reclosers are not acceptable with load current, bushing CT battery chargers.

be - Recloser vacuum interrupter

| Manufacturer | Conditions |
|--|-----------------------|
| <u>Cooper Power Systems</u> | |
| Three phase, Type VW rated 560 amperes continuous, 2,000 amperes symmetrical, maximum voltage 15.5 kV for 12.5/7.2 and 13.2/7.62 kV | To obtain experience. |
| Three phase, Type VWE rated 560 amperes continuous, 12,000 amperes symmetrical, maximum voltage 15.5 kV for 12.5/7.2 and 13.2/7.62 kV | To obtain experience. |
| Three phase, Type VSA-16 rated 560 amperes continuous, 16,000 amperes symmetrical, maximum voltage 15.5 kV for 12.5/7.2 and 13.2/7.62 kV | To obtain experience. |
| Three phase, Type VWV27 rated 560 amperes continuous 12,000 amperes symmetrical, maximum voltage 27 kV for 24.9/14.4 kV | To obtain experience. |
| Three phase, Type VWVE27 rated 560 amperes continuous, 12,000 amperes symmetrical, maximum voltage 27 kV for 24.9/14.4 kV | To obtain experience. |
| Three phase, Type VWV38 rated 50-560 amperes continuous, 12,000 amperes symmetrical, maximum voltage 38 kV for 34.5/19.9 kV | To obtain experience. |

NOTES:

1. Series trip reclosers with ratings greater than 100 amp for 12.5/7.2 kV application, greater than 200 amp for 24.9/14.4 kV application, and 280 amp for 34.5/19.9 kV application are acceptable only with ground trip device. Shunt trip reclosers without ground trip devices may not be used with trip settings higher than 200 amp for 12.5/7.2 kV application, greater than 400 amp for 24.9/14.4 kV application, and 560 amp for 34.5/19.9 kV application.
2. Reclosers are not acceptable with load current, bushing CT battery chargers.

be - Recloser, vacuum interrupter

| Manufacturer | Conditions |
|--|-----------------------|
| <u>Cooper Power Systems</u> | |
| Three phase, Type VWVE38 rated 560 amperes continuous, 12,000 amperes symmetrical, maximum voltage 38 kV for 34.5/19.9 kV | To obtain experience. |
| Three phase, Type VSO-12 rated 560 amperes continuous, 12,000 amperes symmetrical, maximum voltage 38 kV for 34.5/19.9 kV | To obtain experience. |
| Three phase, Type VSO-16 rated 560 amperes continuous, 12,000 amperes symmetrical, maximum voltage 38 kV for 34.5/19.9 kV | To obtain experience. |
| Single phase, type VXE electronically controlled, vacuum interrupting, rated 10-200 amps continuous, 8000 amperes symmetrical, maximum voltage of 15.5 kV for 12.5/7.2 kV & 27 kV for 24.9/14.4 kV systems | To obtain experience. |
| <u>Engineering & Equipment de Mexico</u> | |
| Three phase, type, EEVW15, rated 25 to 560 amp continuous, 12000 amp interrupting, maximum voltage 15.5 kV for 12.4/7.2 kV. | To obtain experience. |
| <u>Joslyn</u> | |
| Three phase, Type JVR, SF6 insulation, rated 400 amps continuous, 6,000 amperes symmetrical, maximum voltage 15 kV for 12.5/7.2 kV | To obtain experience. |
| <u>Lexington Switch</u> | |
| Single phase, type EV627 rated 400 amp continuous, 6000 amp interrupting, maximum voltage 27 kV for 24.9/14.4 kV | To obtain experience. |
| Single phase, type EV815 rated 400 amp continuous, 8000 amp continuous, maximum voltage 15.5 kV for 12.9/14.4 kV | To obtain experience. |

NOTES:

1. Series trip reclosers with ratings greater than 100 amp for 12.5/7.2 kV application, greater than 200 amp for 24.9/14.4 kV application, and 280 amp for 34.5/19.9 kV application are acceptable only with ground trip device. Shunt trip reclosers without ground trip devices may not be used with trip settings higher than 200 amp for 12.5/7.2 kV application, greater than 400 amp for 24.9/14.4 kV application, and 560 amp for 34.5/19.9 kV application.

2. Reclosers are not acceptable with load current, bushing CT battery chargers.

be - Recloser, vacuum interrupter

| Manufacturer | Conditions |
|--|-----------------------|
| <u>Whipp & Bourne</u> Three-phase, Type GVR, SF6 insulation with vacuum interruption, 560 amps maximum continuous, 12000 amps RMS symmetrical interruption for 15.5 kV and 27 kV, 8000 amps RMS symmetrical for 38 kV. 15.5 kV maximum voltage for 12.5/7.2 kV, 27 kV maximum voltage for 24.9/14.4 kV, 38 kV maximum voltage for 34.5/19.9 kV. | To obtain experience. |

NOTES:

1. Series trip reclosers with ratings greater than 100 amp for 12.5/7.2 kV application, greater than 200 amp for 24.9/14.4 kV application, and 280 amp for 34.5/19.9 kV application are acceptable only with ground trip device. Shunt trip reclosers without ground trip devices may not be used with trip settings higher than 200 amp for 12.5/7.2 kV application, greater than 400 amp for 24.9/14.4 kV application, and 560 amp for 34.5/19.9 kV application.
2. Reclosers are not acceptable with load current, bushing CT battery chargers.

be - Recloser, SF6 interrupter

| Manufacturer | Conditions |
|--|-----------------------|
| <u>Hawker Siddeley</u> Type PMR-3/15 rated at 560 amperes continuous, 12,000 amperes symmetrical maximum, 15.5 kV Type PMR-3/27 rated at 560 amperes continuous, 12,000 amperes symmetrical maximum, 24.9 kV | To obtain experience. |

NOTES:

1. Series trip reclosers with ratings greater than 100 amp for 12.5/7.2 kV application, greater than 200 amp for 24.9/14.4 kV application, and 280 amp for 34.5/19.9 kV application are acceptable only with ground trip device. Shunt trip reclosers without ground trip devices may not be used with trip settings higher than 200 amp for 12.5/7.2 kV application, greater than 400 amp for 24.9/14.4 kV application, and 560 amp for 34.5/19.9 kV application.
2. Reclosers are not acceptable with load current, bushing CT battery chargers.

be - Recloser, vacuum interruption with solid dielectric

| Manufacturer | Conditions |
|---|-----------------------|
| <u>ABB</u> Three phase, Type OVR electronically controlled, vacuum interruption, solid dielectric, 630 amps maximum continuous, 12500 amps RMS symmetrical interruption, 15.5 kV maximum for 12.5/7.2 kV, 27 kV maximum for 24.9/14.4 kV. | To obtain experience. |
| <u>Cooper Power Systems</u> Three phase, Type NOVA electronically controlled, vacuum interruption, solid dielectric, 560 amps maximum continuous, 12000 amps RMS symmetrical interruption, 15.5 kV maximum for 12.5/7.2 kV, 27 kV maximum for 24.9/14.4 kV. | To obtain experience. |
| Single Phase, Type NOVA electronically controlled, vacuum interruption, solid dielectric, 400 amps maximum continuous, 8000 amps RMS symmetrical interruption, or 800 amps maximum continuous, 12500 amps RMS symmetrical interruption 15.5 kV maximum for 12.5/7.2 kV, 29.2 kV maximum for 24.9/14.4 kV. | To obtain experience. |
| Three phase, Type NOVA-TS Triple-Single electronically controlled, vacuum interruption, solid dielectric, 400 amps maximum continuous, 12500 amps RMS symmetrical interruption, 15.5 kV maximum for 12.5/7.2 kV, 29.2 kV maximum for 24.9/14.4 kV. | To obtain experience. |
| <u>G & W Electric Company</u> Three phase, electronic, VIPER Series, vacuum interruption, solid dielectric, 800 amps maximum continuous, 12,500 amps RMS symmetrical interruption, 15.5 kV maximum for 12.5/7.2 kV, 27 kV maximum for 24.9/14.4 kV. | To obtain experience. |

NOTES:

1. Series trip reclosers with ratings greater than 100 amp for 12.5/7.2 kV application, greater than 200 amp for 24.9/14.4 kV application, and 280 amp for 34.5/19.9 kV application are acceptable only with ground trip device. Shunt trip reclosers without ground trip devices may not be used with trip settings higher than 200 amp for 12.5/7.2 kV application, greater than 400 amp for 24.9/14.4 kV application, and 560 amp for 34.5/19.9 kV application.
2. Reclosers are not acceptable with load current, bushing CT battery chargers.

Conditional List
be(4.1)
July 2004

be - Recloser, vacuum interruption with solid dielectric

| Manufacturer | Conditions |
|--|-----------------------|
| <u>Joslyn Hi-Voltage</u> Three-phase, Type TRIMOD 300 series, vacuum interruption, solid dielectric foam, 560 amps maximum continuous, 12000 amps RMS symmetrical interruption, 15.5 kV maximum for 12.5/7.2 kV, 27 kV maximum for 24.9/14.4 kV | To obtain experience. |
| Single-phase, Type TRIMOD 100 series, vacuum interruption, solid dielectric foam, 560 amps maximum continuous, 12500 amps RMS symmetrical interruption, 17.1 kV maximum for 12.5/7.2 kV, 29.3 kV maximum for 24.9/14.4 kV | To obtain experience. |

NOTES:

1. Series trip reclosers with ratings greater than 100 amp for 12.5/7.2 kV application, greater than 200 amp for 24.9/14.4 kV application, and 280 amp for 34.5/19.9 kV application are acceptable only with ground trip device. Shunt trip reclosers without ground trip devices may not be used with trip settings higher than 200 amp for 12.5/7.2 kV application, greater than 400 amp for 24.9/14.4 kV application, and 560 amp for 34.5/19.9 kV application.
2. Reclosers are not acceptable with load current, bushing CT battery chargers.

bh - Clevis, Service Deadend

Applicable Specification: "RUS Specification for Service Deadend Clevises," D-8

| Manufacturer | Clevis Only* | Clevis with dry process spool | Clevis with wet process spool |
|-----------------------|--------------|----------------------------------|----------------------------------|
| Dixie | D0341 | D0341-D | D0341-W |
| Hubbell (Chance) | 0341 | 0341-0606 | 0341-C909-1931 |
| Joslyn | J0313 | - | - |
| Kortick | K9250 | K9100 | K9099 |
| MacLean (Continental) | U32136 | U31136 | U36136 |

*Catalog number does not include spool; for spool see Page cm.

bi - Gain, Pole

For use with rectangular crossarms

| | |
|-----------------------|----------|
| Hubbell (Chance) | 4092 |
| Joslyn (Flagg) | PX252 |
| MacLean (Continental) | CAG-44-5 |

For braceless crossarms (narrow profile construction)

| | |
|-----------------------|------------|
| Joslyn (Flagg) | PX182A |
| MacLean (Bethea) | GCAF-6A |
| MacLean (Continental) | DEA-65-10A |

Transmission

Grid Gains

| | Sizes in inches | |
|-----------------------|-----------------|------------|
| | 4" x 4" | 4" x 9" |
| Hubbell (Chance) | PG44 | PG945 |
| Hughes Brothers | I263 | I260 |
| Joslyn (Flagg) | PX122 | PX260 |
| MacLean (Bethea) | GSF-44-7 | GSFT-95-7 |
| MacLean (Continental) | GGSF-4040-7 | GRF-9045-7 |

bj - Guy Hook

Applicable Specification: Edison Electric Institute Specification TD-11- 1951, "Specifications for Guy Hooks and Guy Strain Plates."

| | |
|-----------------------|-------|
| Dixie | D6584 |
| Hubbell (Chance) | 6584 |
| Joslyn | J1019 |
| Kortick | K4031 |
| MacLean (Continental) | U5310 |

bk-1
July 2004

bk - Guy Plate

Applicable Specifications:

Strain Type: Edison Electric Institute Specification TD-11 1951, "Specifications for Guy Hooks and Guy Strain Plates."

Lift Type: None

| | Strain Type 4" x 8" x 14 gage | Lift Type 2-1/2" x 7" x 1/4", 2 hole |
|-----------------------|----------------------------------|---|
| Almat | K45-1 | - |
| Dixie | D6575 | D7888 |
| Hubbell (Chance) | 6575 | 7898 |
| Joslyn | J1034 | - |
| Kortick | K4015 | K3511 |
| Line Hardware | GSP-1 | - |
| MacLean (Continental) | U5351 | UC434 |

bn - clamp, loop deadend

For ACSR

| | 3/0 | 2/0 | 1/0 | 2 | 4 |
|--------------------|------------|----------|------------|------------|------------|
| ALCOA | - | 413 | 413 | 412 | 411 |
| Blackburn | DLC23 | DLC2106 | DLC2106 | DLC2106 | DLC2106 |
| Burndy | - | - | UW25R | UW2R | UW2R |
| C & R | - | - | CRLD-10 | CRLD-10 | CRLD-10 |
| Hubbell (Anderson) | LC-74B | LC-71B | LC-70B1 | LC-70B | LC-70B |
| Hubbell (Fargo) | GA-145 | GA-145 | GA-144 | GA-144 | GA-144 |
| MacLean (Bethea) | ALD-7373-U | ALD-34-U | ALD-1313-U | ALD-1313-U | ALD-1313-U |

bo-1
July 2004

bo - Shackle, anchor

Distribution

| | <u>20,000 lbs.</u> <u>5/8" Pin</u> |
|--------------------|---------------------------------------|
| Dixie | D5801 |
| Hubbell (Anderson) | AS-25 |
| Hubbell (Chance) | 5801 |
| Joslyn | J2742 |
| Kortick | K4481 |
| Lapp | 33852 |
| Lindsey | 3260 |
| Line Hardware | AS-1 |
| MacLean (Bethea) | ASH-45 |
| Sur-Loc, Inc. | 5500 |

Transmission

| | <u>30,000 lbs.</u> <u>3/4" bolt</u> | <u>50,000 lbs.</u> <u>7/8" bolt</u> |
|------------------|--|--|
| Joslyn | BT3023BNK | BT3036BNK |
| MacLean (Bethea) | ASH-56-BC | ASH-67-BC |

br - Chain Link (End Link)

| <u>Manufacturer</u> | <u>Catalog Number</u> |
|---------------------|-----------------------|
| Joslyn | BT-3082 |
| Lapp | 6415-HT |
| Lindsey | 3403 |
| MacLean (Bethea) | CL-5 |

bs-1
July 2004

bs - Bolt, single upset

Applicable Specifications: "RUS Specifications for Single and Double Upset Spool Bolts," D-5

| | | | | |
|-----------------------|-----------|-----------|-----------|-----------|
| Diameter, inches | 5/8 | 5/8 | 5/8 | 5/8 |
| Length, inches | 7 | 8 | 9 | 10 |
| Dixie | D7740 | D7741 | D7741-1/2 | D7742 |
| Hubbell (Chance) | - | 7741 | 7741-1/2 | 7742 |
| Joslyn | - | J2342-1/2 | J2343-1/2 | J2344-1/2 |
| Kortick | K4929 | K4950 | K4930 | K4951 |
| MacLean (Continental) | U3105-1/2 | U31053 | U31053A | U31054 |

bt - Wireholder, clevis type
with No. 24 wood screw

(For use with triplex type service cable, Drawing K10C-A)

| | |
|------------------|-------|
| Dixie | D075* |
| Hubbell (Chance) | 0192* |
| Joslyn | J075* |

*Catalog number does not include insulator. Use secondary type spool insulator with 1-3/4 inch groove diameter. See page cm-1.

bu-1
July 2004

bu - Connector, grounding
for transformer or other equipment

| Manufacturer | Copper Alloy ¹ | Plated Copper Alloy ² | Aluminum Alloy ³ |
|--------------------|---------------------------|----------------------------------|-----------------------------|
| Blackburn | TTC-4 | TTC2P | - |
| Burndy | EQC632C | EQC632C-TN | - |
| Dossert | TGCL8-50 | TGCL8-50-SN | - |
| Hubbell (Anderson) | GTCL-23A | GTCL-23A-TP | - |
| Hubbell (Fargo) | GC-207 | GC-207P | GA-220 |
| Line Hardware | TGL-110 | TGL-110P | - |
| Maclean (Reliable) | BVC-207 | - | - |
| Penn-Union | GSE-C1 | GSE-C1TN | - |
| Tanner | - | GET-1-TN | - |

1 - For use with copper type ground wire.

2 - For use with both copper and aluminum type ground wire.

3 - For use with aluminum type ground wire.

bv - Rods, armor

(includes standard, double insulator, and tapping rods)

Aluminum or aluminum alloy rods for use on ACSR

| | |
|--------------------------------|-------------|
| Alcoa Conductor Accessories | Formed Type |
| Dulmison | Formed Type |
| Florida Wire and Cable | Formed Type |
| Helical Line Products | Formed Type |
| Helix Uniformed Ltd. | Formed Type |
| Preformed Line Products | Formed Type |

Copperweld rods for copper or CWC conductor

| | |
|-------------------------|-------------|
| Dulmison | Formed Type |
| Helical Line Products | Formed Type |
| Preformed Line Products | Formed Type |

Alumoweld rods for aluminum clad steel (Alumoweld)
overhead ground wire

| | |
|-------------------------|-------------|
| Dulmison | Formed Type |
| Helical Line Products | Formed Type |
| Preformed Line Products | Formed Type |

bx - Splice, automatic

| <u>Copper</u> | <u>Hubbell (Fargo)</u> | <u>MacLean (Reliable)</u> |
|---|------------------------|---------------------------|
| 6 | GL-111 | 61 |
| 4 | GL-112 | 41 |
| 2 x 3 | GL-115 | - |
| 1/10 x 7 | GL-117 | 107 |
| 2/0 x 7 | GL-118 | 207 |
| 3/0 x 7 | GL-119 | 307 |
| 4/0 x 7 | GL-120 | 407 |
| <u>CWC</u> | | |
| 8A | GL-112 | - |
| 6A | GL-113 | 47 |
| 4A | GL-115 | 27 |
| 2A | GL-117 | - |
| <u>ACSR</u> | | |
| | GL-400A Series* | 7650 Series* |
| <u>Aluminum Alloy (6201 and 5005)</u> | | |
| | GL-400A Series | AL55 Series |

*For use on conductors 4/0 and smaller only.

bx - Splice, automatic

| Manufacturer | Conditions |
|--------------|------------|
|--------------|------------|

DISTRIBUTION

Blackburn

| | |
|---|--|
| #4, #2 ACSR or 6201 (ACSR equiv.) ATS42 | 1. To obtain experience. |
| 1/0, 2/0 ACSR or 6201 (ACSR equiv.) ATS1020 | 2. For use on distribution systems only. |
| 3/0, 4/0 ACSR or 6201 (ACSR equiv.) ATS3040 | |
| 266.8, 336.4 kcmil ACSR ATS266336 | |
| 477 kcmil ACSR ATS397477 | |

Hubbell (Fargo)

| | |
|------------------------|----------------|
| AWAC 4 - 4/3 GLA-105 | Same as above. |
| AWAC 2 - 4/3 GLA-110 | |
| AWAC 1/0 - 4/3 GLA-115 | |

| | |
|------------------------------|----------------|
| 266.8 kcmil ACSR 18/1 GL-410 | Same as above. |
| 336.4 kcmil ACSR 18/1 GL-411 | |
| 477 kcmil ACSR 18/1 GL-413 | |

MacLean (Reliable)

| | |
|----------------------------|----------------|
| 266.8 kcmil ACSR 18/1 7657 | Same as above. |
| 336.4 kcmil ACSR 18/1 7658 | |
| 477 kcmil ACSR 18/1 7659 | |

DISTRIBUTION AND TRANSMISSION

Hubbell (Fargo)

| | |
|-----------------------|-----------------------|
| 266.8 kcmil ACSR 26/7 | To obtain experience. |
| 336.4 kcmil ACSR 26/7 | |
| 477 kcmil ACSR 26/7 | |

by-1
July 2004

by - Deadend, automatic and formed Type

| <u>Conductor Size</u> | | | |
|-----------------------|------------|----------------------------|-------------------------------|
| <u>Cu</u> | <u>CWC</u> | <u>Hubbell (Fargo)</u> | <u>Maclean (Reliable)</u> |
| - | 4A | GD-515 | 27-SDS |
| - | 6A | GD-513 | 47-SDS |
| - | 8A | GD-512 | - |
| 2 x 3 | - | GD-515 | 271 |
| 4 | - | GD-512 | 41LD |
| 6 | - | GD-511 | 61LD |

ACSR

| | |
|---------------------|----------------------------|
| *Blackburn | ATD Series |
| *Dulmison | AWDG-0805, 0990, and 1135 |
| *Hubbell (Fargo) | GD-400 Series |
| *MacLean (Reliable) | 7650 Series |
| *Preformed | OG-9360 thru 9366 |
| | #OHDE-9534 thru 9540, 4577 |

#May only be used with a spool insulator (Item cm) and appropriate clevis for neutral and secondary applications.

*For use on conductors 4/0 and smaller only.

Aluminum Alloy (6201 and 5005)

| | |
|--------------------|-------------------|
| Blackburn | ATD Series |
| Hubbell (Fargo) | GD-A Series |
| MacLean (Reliable) | AL Series |
| Preformed | OG-9360 thru 9366 |

by - Deadends, automatic and formed type

FORMED TYPE

| <u>Manufacturer</u> | <u>Conditions</u> |
|--------------------------------|-----------------------|
| <u>Preformed Line Products</u> | |
| AWAC 4 - 4/3 DG-4560 | To obtain experience. |
| AWAC 2 - 4/3 DG-4562 | |
| AWAC 1/0 - 4/3 DG-4565 | |

AUTOMATIC TYPE

| | |
|--------------------------------|--|
| <u>Hubbell (Fargo)</u> | |
| AWAC 4 - 4/3 GDA-235 | To obtain experience. |
| AWAC 2 - 4/3 GDA-240 | |
| AWAC 1/0 - 4/3 GDA-245 | |
| 266.8 kcmil ACSR 18/1 GD-53I5A | 1. To obtain experience. |
| 336.4 kcmil ACSR 18/1 GD-53I5A | 2. For use on distribution lines only. |
| 477 kcmil ACSR 18/1 GD-5325A | |
| <u>MacLean (Reliable)</u> | |
| AWAC 4 - 4/3 5201 | To obtain experience. |
| AWAC 2 - 4/3 5202 | |
| AWAC 1/0 - 4/3 5204 | |
| 226.8 kcmil ACSR 18/1 7657 SDS | 1. To obtain experience. |
| 335.4 kcmil ACSR 18/1 7658 SDS | 2. For use on distribution lines only. |
| 477 kcmil ACSR 18/1 7659 SDS | |

bz - Switch, oil

12.5/7.2 kV

| | Type | Description |
|----------------------|-----------------|--|
| ABB | CSL** | Single-phase, manual and remote manual or elec. control, 200 amp. Three-phase, remote manual or elec. control, 200 amp. |
| Cooper Power Systems | NR* | Single-phase, remote elec. control, 200 amp. |
| | VR* | Three-phase, remote elec. control, 400 amp. |
| General Electric | FKC-2 | Single and three-phase, manual, 200 amp. |
| | FKC-2* | Single and three-phase, remote control, 200 amp. |
| Maysteel Trinetics | CSD-95, CSD-125 | Single-phase, manual and remote manual or elec. control, 200 amp. Three-phase, remote manual or elec. control, 200 amp. |

*Control equipment should be selected in accordance with the requirements of individual installations.

**This item is also available in a special design for use in areas where corrosion is a serious problem.

bz - Switch, oil

| Manufacturer | Conditions |
|---|--|
| <u>Cooper Power Systems</u> Capacitor oil switch Type TSC, 38 kV max. 100 ampere capacitor switch, 300 ampere load switch | 1. To obtain experience. |
| Oil switch with 125 kV BIL accessory Type NR, 15 kV, single- phase, remote electric control, 200 amp. at 75 to 100 percent power factor | 1. To obtain experience. 2. For use on single- phase taps of 24.9/14.4 kV multi- grounded wye systems. |

Conditional List
bz(2)
July 2004

bz - Switch, vacuum
(For capacitor switching)

| Manufacturer | Conditions |
|---|---|
| <u>Joslyn</u> Capacitor vacuum switch, VerSaVac, 200 Amp, 95 or 125 kV BIL, single-phase or three-phase for use on 15 kV systems | <ol style="list-style-type: none">1. To obtain experience.2. Single-phase switch rated 125 kV BIL may be used on single- phase taps of 24.9/14.4 kV multi-grounded wye systems.3. Three-phase switch requires special mounting bracket. |

cg - Switch, air, three-pole, group-operated
NEMA standard switches for station and line structures

| Manufacturer | Acceptable Mounting on Structures | Tilting Ins. | | Vertical Break | | Side Break | | Center Break | | Double Break | |
|------------------------------|--|--------------|----------------|-------------------------|-------------------------------|-------------------|-----------------|-------------------|---------------------------|--------------|----|
| | | Type | kV | Type | kV | Type | kV | Type | kV | Type | kV |
| ABB | Horizontal Horizontal | | | TTR6 TTR8 | 345 15-230 | | | | | | |
| G & W Electric Co. | Horizontal | | | MK-40 | 15-69 | PMB-40A | 15-69 | LPC | 69-230 | | |
| Hubbell (Chance) | Horizontal Phase over Phase Vertical | | | D6(L) D6(L) D6(L) | 15-34.5 15-34.5 15-34.5 | | | | | | |
| Johnson | Horizontal | | | VIP | 15-230 | LS | 15-69 | M | 15-230 | | |
| Joslyn (Hi-Voltage) | Horizontal Horizontal | | | RF-2(VL) | 15-230 | RB-1(VL) RB-1* | 15-25 15-115 | | | | |
| Kearney/Cooper Power Systems | Horizontal | AR 60-P | 15-69 | | | | | | | | |
| MEMCO | Horizontal Horizontal | AgF AgC | 15-69 15-69 | EA | 15-345 | RI4-C | 15-46 | EE | 69-230 | | |
| MORPAC (Morgan) | Horizontal Vertical Phase over Phase | | | VBV (VL) VBV (VL) | 15-230 15-230 | | | CBV CBV CBV | 15-230 15-230 15-25 | | |
| Royal Switchgear | Horizontal Phase over Phase | | | | | | | V V | 15-230 15-23 | | |

(L) Means gas or solid material full-load interrupters are accepted and available.

(VL) Means vacuum full-load interrupters are accepted and available.

*These switches may be purchased with reduced voltage vacuum interrupters and may be applied for loop sectionalizing duty when peak recovery voltage does not exceed 25 kV

NOTE: Phase-over-phase mounted switches are not acceptable above 25 kV class unless equipped with full-load interrupters. Switches of 15 kV and 25 kV classes with individual phases mounted on wood crossarms or poles must be supplied with insulated interphase and control rods.

cg - Switch, air, three-pole, group-operated
NEMA standard switches for station and line structures

| Manufacturer | Acceptable Mounting on Structures | Tilting Ins. | | Vertical Break | | Side Break | | Center Break | | Double Break | |
|-----------------|-----------------------------------|--------------|----|-----------------|---------|------------------|--------|--------------|----------|--------------|---------|
| | | Type | kV | Type | kV | Type | kV | Type | kV | Type | kV |
| S & C*** | Horizontal | | | Alduti(L) | 15-34.5 | Alduti(L) | 15-25 | | | Alduti(L) | 34.5-46 |
| | Phase over Phase | | | Alduti(L) | 15-25 | Alduti(L) | 15-25 | | | Alduti(L) | 34.5-46 |
| | Vertical | | | Alduti(L)* | 15-34.5 | Alduti(L) | 15-25 | | | Alduti(L)* | 34.5-46 |
| SEECO | Phase over Phase | | | GOABS(VL) 15-69 | | | | | | | |
| Siemens-Allis | Horizontal | | | AVB(VL)** | 115-345 | | | CB | 115-230 | | |
| | | | | | | | | CBL-2 | 115-230 | | |
| Southern States | Horizontal | | | EV | 15-230 | | | | | | |
| Turner | Phase over Phase | | | TA(VL) | 15-69 | SSB-T | 15-69 | EC | 115-230 | | |
| | | | | | | (1D, 2D, 3D)(VL) | | | | | |
| | | | | | | | 15-161 | | | | |
| | Horizontal | | | | | 1D(VL) | 15-161 | | | | |
| | Horizontal | | | TH1(VL) | 15-161 | | | | | | |
| USCO | Horizontal | | | AVR(VL)** | 15-230 | ASB | 35-138 | AGCH ** | 15-345 | | |
| | Horizontal | | | | | | | AGCH-V** | 34.5-230 | | |
| | Phase over Phase | | | | | ASB-II | 15-25 | GCH | 15-23 | | |

(L) Means gas or solid material full-load interrupters are accepted and available.

(VL) Means vacuum full-load interrupters are accepted and available.

*These switches, except 34.5 kV Alduti vertical break, are available and accepted with the S & C type SMD substation fuse cutouts listed on page af-3.

** Also available in bronze in some ratings.

***Available with porcelain insulators. Available with "Cypoxy" cycloaliphatic epoxy insulators through 34.5 kV on request.

NOTE: Phase-over-phase mounted switches are not acceptable above 25 kV class unless equipped with full-load interrupters. Switches of 15 kV and 25 kV classes with individual phases mounted on wood crossarms or poles must be supplied with insulated interphase and control rods.

cg - Switch, air, three pole, group operated
(Factory Preamsembled)
(FOR USE ON STEEL SUBSTATION STRUCTURES)

| Manufacturer | Mounting | Vertical Type | kV | Side Break Type | kV |
|------------------|------------------|-----------------------------|----|----------------------------|----|
| Hubbell (Chance) | Vertical | - | | D7(L) 15-27 | |
| | Horizontal | - | | D7(L) 15-27 | |
| S & C* | Phase-over-Phase | Alduti(L) 34.5(200 kV BIL) | | Alduti(L) 34.5(200 kV BIL) | |
| | Vertical | Alduti (L) 34.5(200 kV BIL) | | | |

(L) Means gas or solid material full-load interrupters are accepted and available.

*Available with porcelain insulators. Available with "Cypoxy" cycloaliphatic epoxy insulators through 34.5 kV on request.

cg - Switch, air, three-pole, group operated

(not Suitable for Substation Use)

cg-3
July 2004

| <u>Manufacturer</u> | <u>Acceptable Mounting</u> | <u>Vertical Break</u> | | <u>Side Break</u> | | <u>Center Break</u> | |
|--------------------------------|--------------------------------|-----------------------|-----------|-------------------|-----------|---------------------|-----------|
| | | <u>Type</u> | <u>kV</u> | <u>Type</u> | <u>kV</u> | <u>Type</u> | <u>kV</u> |
| Hubbell (Chance) | Horizontal | D7(L) | 15-34.5 | D6(L) | 15-34.5 | | |
| | Phase over Phase | | | D6(L) | 15-34.5 | | |
| | Vertical | | | | | | |
| Cooper Power Systems (Kearney) | Horizontal | | | M-FORCE(L) | 15-35 | | |
| | Phase over Phase | | | M-FORCE(L) | 15-35 | | |
| | Vertical | | | M-FORCE(L) | 15-35 | | |
| Royal Switchgear | Horizontal | | | | | V | 15-23 |
| | Phase over Phase | | | | | V | 15-23 |

(L) Means gas or solid material full-load interrupters are accepted and available.

(VL) Means vacuum full-load interrupters are accepted and available.

NOTE: Phase-over-phase mounted switches are not acceptable above 25 kV class unless equipped with full-load interrupters. Switches of 15 kV and 25 kV classes with individual phases mounted on wood crossarms or poles must be supplied with insulated interphase and control rods.

cg - Switch, three-pole, group-operated
(Factory Preassembled)

| Manufacturer | Acceptable Mounting on Structures | Vertical Break | | Side Break | |
|--|-----------------------------------|----------------|---------------|--------------|-------|
| | | Type | kV | Type | kV |
| ABB | Horizontal (A) | | | SLB-3(L) | 15-25 |
| Bridges Electric [#] | Horizontal (A) | | | Vector(L) | 15-27 |
| | Phase over phase (A) | | | Vector(L) | 15-27 |
| | Vertical (A) | | | Vector(L) | 15-27 |
| [#] Both operating shaft and hookstick versions of switch accepted. | | | | | |
| Cooper Power Systems (Kearney) | Horizontal (A) | | | M-FORCE | 15-35 |
| | Phase over phase (A) | | | M-FORCE | 15-35 |
| | Vertical (A) | | | M-FORCE | 15-35 |
| Hubbell (Chance) | Horizontal (A) | | | D7(L) | 15-27 |
| | Phase over phase (A) | | | D7(L) | 15-27 |
| | Vertical (A) | | | D7(L) | 15-27 |
| | Horizontal (B) | | | D7(L) | 34.5 |
| | Phase over phase (B) | | | D7(L) | 34.5 |
| | Vertical (B) | | | D7(L) | 34.5 |
| Inertia Engineering | Horizontal (A) | | | LBS(L) | 15-35 |
| | Vertical (A) | | | LBS(L) | 15-35 |
| | Phase over phase (A) | | | LBS(L) | 15-35 |
| S&C* | Horizontal (A) | | | Alduti(L) | 15-25 |
| | | | | Alduti(L) | 34.5 |
| | | | | (200 kV BIL) | |
| | Phase over phase (A) | | | Alduti(L) | 25 |
| | | | | Alduti(L) | 34.5 |
| | | | | (200 kV BIL) | |
| | Vertical (A) | | | Alduti(L) | 15-25 |
| | | | | Alduti(L) | 34.5 |
| | | | | (200 kV BIL) | |
| | Phase over phase (B) | | Alduti(L)34.5 | Alduti(L) | 34.5 |
| | Vertical (B) | | Alduti(L)34.5 | | |

(L) Means gas or solid material full-load interrupters are accepted and available.

(A) Not suitable for substation use.

(B) For station and transmission use only. The steel crossarm base must be grounded with an adequate grounding connector. 200 kV BIL only.

NOTE: Switches with factory-assembled crossarm type bases for distribution lines must have non-conducting crossarm type bases, non-conducting braces, and insulated interphase and control rods, except as otherwise noted.

* Available with porcelain insulators. Available with "Cypoxy" cycloaliphatic epoxy insulators through 34.5 kV on request.

cg - Switch, air, three-pole, group operated

| Manufacturer | Conditions |
|--|---|
| <u>Cleaveland/Price</u> Type V2-C (15-69 kV) Vertical break, horizontal or vertical mounting Type RL-C (15-69 kV) Single side break, horizontal or vertical mounting | 1. To obtain experience. 2. Insulated interphase and control rods required on wood distribution structures. |
| <u>G & W Electric Company</u> Type MK-40A 15 kV through 345 kV(horizontal upright mounting) Type LPV, 3-pole 72.5-272 kV, 1200 amp., 1600 amp., 2000 amp., center sidebreak for horizontal mounting. | 1. To obtain experience. 2. Insulated interphase and control rods required on 15 kV and 23 kV models used on wood structures. 3. Steel interphase base required when mounted as in RUS Drawing TM-3. To obtain experience. |
| <u>Hubbell (Chance)</u> Type AR Side-break, horizontal phase-over-phase, and vertical mounting, with non-conducting crossarm type base and insulated interphase and control rods, 15, 25 and 34.5 kV(grounded wye) | To obtain experience. |

(L) Means full-load interrupter accepted and available.

(VL) Means vacuum full-load interrupters are accepted and available.

cg - Switch, air, three-pole, group-operated

| Manufacturer | Conditions |
|---|--|
| <u>PASCOR</u> VBP (15 - 230 kV) VBS (69 - 230 kV) Vertical break, vertical or horizontal mounting. Phase-over-Phase mounting(VBS, 69 - 115 kV only) | 1. To obtain experience. 2. Insulated interphase and control rods required on wood distribution structures. |
| SB (15 - 69 kV) Side break, vertical or horizontal mounting. | 1. To obtain experience. 2. Insulated interphase and control rods required on wood distribution structures. |
| CB (15 - 115 kV) Center break, vertical or horizontal mounting. | 1. To obtain experience 2. Insulated interphase and control rods required on wood distribution structures. |
| CBSA (69 - 138 kV) Center Break Vee, vertical, horizontal, or phase-over-phase mounting. (Also accepted as a copper switch at 69 - 115 kV.) | To obtain experience. |
| <u>S & C*</u> Line-rupter with SF ₆ interrupter. Horizontal mounted 115-230 kV | To obtain experience. |
| Omni-Rupter (L) Side-break, horizontal phase-over-phase, and vertical mounting, with non-conducting crossarm type base and insulated interphase and control rods, 15 kV and 25 kV | To obtain experience. |

(L) Means full-load interrupter accepted and available.

(VL) Means vacuum full-load interrupters are accepted and available.

*Available with porcelain insulators. Available with "Cypoxy" cycloaliphatic epoxy insulators through 34.5 kV on request.

cg - Switch, Air, Three-Pole, Group Operated

| Manufacturer | Conditions |
|--|--|
| <u>SEECO</u> GOABS (VL) Vacuum interrupter type 115-169 kV | To obtain experience. |
| <u>Southern States</u> "Pole-Pak" 15-23 kV | To obtain experience. |
| Type ES; 15, 23 and 34.5 kV (horizontal upright models only) | <ol style="list-style-type: none"> 1. To obtain experience. 2. For 15 kV and 23 kV distribution lines, insulated interphase and control rod spacers required. See RUS Drawings M3-15 and VM3-16. 3. NEMA insulators and steel interphase base required for transmission line structure as in TM-3. 4. Acceptable on steel substations 15 through 34.5 kV with NEMA insulators and uninsulated interphase rods. |
| Type 57L sidebreak, 115-161 kV, 600 and 1200 amp., horizontal upright | To obtain experience. |
| Type CBL-T, 15-69 kV, 1200 amp (center break, horizontal upright mounting) | <ol style="list-style-type: none"> 1. To obtain experience. 2. Insulated interphase and control rods required on 15 kV and 25 kV models used on wood structures. |
| <u>Travis Switchgear</u> MA-32512, 25 kV, 150 kV BIL, vertical break | <ol style="list-style-type: none"> 1. To obtain experience. 2. Insulated interphase and control rods required when used on wood structures. |

(L) Means full-load interrupter accepted and available.

(VL) Means vacuum full-load interrupters are accepted and available.

ci - Clevis, thimble

Rated Strength

| Manufacturer | 20,000 lbs. | 40,000 lbs. | 50,000 lbs. |
|----------------|-------------|-------------|-------------|
| Joslyn (Flagg) | PA271 | PA272B | - |

cj - Pole Ground Wire

Soft annealed iron, BB Grade, class C galvanizing
(For pole protection only)

Size
1.15 Ohms/1000 ft., max.

Manufacturer

| | |
|--------------------------|-------------------|
| Florida Wire and Cable | 3-wire, 5/16 inch |
| Indiana Steel and Wire | 3-wire, 5/16 inch |
| National Strand Products | 3-wire, 5/16 inch |
| Southwire | 3-wire, 5/16 inch |

Copper, soft annealed solid
ASTM Specification B3

Manufacturer
(See page av-2)

Aluminum (for above ground use only)
Hard-drawn

Manufacturer
(See page av-1)

Aluminum Alloy (for above ground use only)

| <u>Manufacturer</u> | <u>Type</u> |
|---------------------|-------------|
| Alcan Cable | 6201 |
| American Electrical | 6201 |
| Southwire | 6201 |

Copper-Clad Steel, Annealed 40 percent Conductivity

| <u>Manufacturer</u> | <u>Size</u> |
|----------------------|-------------|
| Copperweld Southern* | No. 6 |

* Not for use on distribution when neutral is larger than #1/0 ACSR.

ck - clamp, anchor rod bonding

For Standard and Drive Type Rods

| Diam. of Rod | Type of Eye | 5/8" | 3/4" | 1" |
|-----------------------|-------------|---------|---------|---------|
| C & R Products | Single | CRBC-1 | CRBC-1 | CRBC-1 |
| | Twin | CRBC-2 | CRBC-2 | CRBC-2 |
| | Triple | - | CRBC-3 | CRBC-3 |
| Dixie | Single | D3143 | D3143 | D3143 |
| | Twin | - | D3144 | D3144 |
| | Triple | - | D3145 | D3145 |
| Hubbell (Chance) | Single | G5060 | G5060 | G5060 |
| | Twin | G5061 | G5061 | G5061 |
| | Triple | - | G5063 | G5063 |
| Joslyn | Single | 3230 | 3230 | 3230 |
| | Twin | 3231 | 3231 | 3231 |
| | Triple | - | 3233 | 3233 |
| Kortick | Single | K3147 | K3147 | - |
| | Twin | - | K3148 | K3148 |
| | Triple | - | K3149 | K3149 |
| Line Hardware | Single | RBC-100 | RBC-100 | RBC-100 |
| | Twin | RBC-200 | RBC-200 | RBC-200 |
| | Triple | | RBC-300 | RBC-300 |
| MacLean (Continental) | Single | UCG5060 | UCG5060 | - |
| | Twin | - | UCG5061 | UCG5061 |
| | Triple | - | UCG5063 | UCG5063 |

For Power Installed Screw Anchors

| | | | | |
|------------------|--------|---------|---------|---|
| C & R Products | Single | CRBC-4 | CRBC-5 | - |
| Hubbell (Chance) | Single | G5067 | G5068 | - |
| Joslyn | Single | J26714 | J26715 | - |
| Line Hardware | Single | RBC-400 | RBC-500 | - |

cm-1
July 2004

cm - Insulator, Spool

| Type: | <u>Secondary (Wet Process)</u> | | <u>Service</u> | |
|---------------------------|--------------------------------|-----------|--------------------|--------------------|
| | | | <u>Wet Process</u> | <u>Dry Process</u> |
| Groove Diameter: | <u>1-3/4"</u> | <u>3"</u> | <u>1-3/8"</u> | <u>1-3/8"</u> |
| ANSI Class | 53-2 | 53-4 | 53-1 | NA |
| Cooper Power Systems | DE4S3 | DE5S3 | DE2S2 | DE2S1 |
| Hughes | 2102 | - | - | - |
| Joslyn | - | J0101A | J150A | J100A |
| Kortick | K516 | K522 | K513 | K514 |
| MacLean (Continental) | U205 | U31221 | U208 | U207 |
| Porcelain Products (Knox) | 5101 | 5119 | 5107 | 5207 |
| Universal | 1082 | - | - | - |
| Victor Insulators, Inc. | 2012 | 2026 | 2011 | - |

cm – Insulators, spool (Polymer)

| Manufacturer | Conditions |
|--|-----------------------|
| Hubbell (Chance) C909-1032P (ANSI Class 53-2) | To obtain experience. |

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cp - Deadend, Compression Type

ACSR

| Conductor Size | Alcoa | Burndy | |
|------------------|--|-----------------|------------------------------|
| 1/0 | Order by Conductor Size and <u>Stranding</u> | | Type Y-W |
| 2/0 | | | " |
| 3/0 | | | " |
| 4/0 | | | " |
| 266.8 kcmil 18/1 | | | |
| 336.4 kcmil 18/1 | | | |
| 477 kcmil 18/1 | | | |
| 266.8 kcmil 26/7 | 2-piece alloy compression Type VES or HES " | | Type Y-W |
| 336.4 kcmil 26/7 | | | Type YTW |
| 477 kcmil 26/7 | | | " |
| 556.5 kcmil 26/7 | | | " |
| 795 kcmil 26/7 | | | " |
| 954 kcmil 54/7 | | | " |
| Conductor Size | Hubbell (Anderson) | Hubbell (Fargo) | Kearney/Cooper Power Systems |
| 1/0 | VCD-50R | SEDA-8129 | 104000 |
| 2/0 | thru | SEDA-7729 | thru |
| 3/0 | VCD-61R | SEDA-7829 | 104000-03 |
| 4/0 | " | SEDA-7929 | " |
| 266.8 kcmil 18/1 | VCD-80-R | | |
| 336.8 kcmil 18/1 | VCD-80-R | | |
| 477 kcmil 18/1 | VCD-812-R | | |
| 266.8 kcmil 26/7 | VCD-831-1-RM | Uni-Grip | 104000-05 |
| 336.4 kcmil 26/7 | VCD-831-1-RM | one die | thru |
| 477 kcmil 26/7 | VCD-832-2-RM | system | 104000-14 |
| 556.5 kcmil 26/7 | VCD-833-3-RM | Order by | " |
| 795 kcmil 26/7 | VCD-835-4RM | conductor size | |
| 954 kcmil 54/7 | VCD-835-4RM | and stranding | |

NOTE: These compression deadends are acceptable when installed using tools and dies in accordance with the deadend manufacturer's recommendations.

cp - Deadend, Compression Type

ACSR
Adjustable

Hubbell (Fargo) Order by conductor size and
stranding

Aluminum Alloy
(6201 and 5005)

Conductor Size: 4 thru 4/0

Hubbell (Anderson) Type VCD, Order by conductor size

| | <u>Copper</u> | | |
|------------------------|---------------|----------|----------|
| <u>Conductor Size:</u> | <u>2 x 3</u> | <u>4</u> | <u>6</u> |
| National Tel. Supply | 71-258/3X | 71-204-P | 71-162-J |

| | <u>Copperweld-Copper</u> | |
|------------------------|--------------------------|-----------|
| <u>Conductor Size:</u> | <u>6A</u> | <u>8A</u> |
| National Tel. Supply | 71-6A-P | 71-8A-P |

NOTE: These deadends are acceptable when installed with tools and dies in accordance with the deadend manufacturer's recommendations.

cp - Deadend, compression type

| Manufacturer | Conditions |
|--|-----------------------|
| <u>Burndy</u> AWAC 4-4/3 YTW7M10T AWAC 2-4/3 YTW7M9T AWAC 1/0-4/3 YTW7M7T | To obtain experience. |

NOTE: These deadends are acceptable when installed with tools and dies in accordance with the deadend manufacturer's recommendations.

cq-1
July 2004

cq - Deadend, Secondary
(For use on secondary deadends only)

Copper
Offset Compression

| <u>Conductor Size:</u> | <u>4</u> | <u>6</u> |
|---------------------------|----------|----------|
| National Telephone Supply | 91-204-P | 91-162-J |

Copperweld-Copper
Offset Compression

| <u>Conductor Size:</u> | <u>6A</u> | <u>8A</u> |
|---------------------------|-----------|-----------|
| National Telephone Supply | 91-6A-P | 91-8A-P |

Copperweld-Copper
Automatic Deadend

| <u>Conductor Size:</u> | <u>6A</u> | <u>8A</u> |
|------------------------|-----------|-----------|
| Hubbell (Fargo) | GD-113 | GD-112 |
| MacLean (Reliable) | 47FD | - |

cr - Bracket, Angle Suspension

Applicable Specifications: "RUS Specification for Angle Suspension Brackets," DT-4

| <u>Manufacturer.</u> | <u>Distribution 5/8" Diam</u> | <u>Transmission 3/4" Diam.</u> |
|-----------------------|-----------------------------------|------------------------------------|
| Hubbell (Chance) | - | 5728 |
| Joslyn | - | J7936 |
| Kortick | K6231 | K6230 |
| MacLean (Continental) | U545 | U546 |

cs-1
July 2004

cs - Bracket, Pole Top Pin

For Transmission and 24.9/14.4 kV Distribution

Applicable Specifications: "RUS Specifications for Pole Top Brackets for Channel Type Pins," D-14

| | |
|-----------------------|--------|
| Hubbell (Chance) | 2157 |
| Kortick | K8130 |
| MacLean (Continental) | U36690 |

ct - Plate, Double Arming

Transmission

| Manufacturer | 4" x 1/2" x 24" | 4" x 1/4" x 17" |
|-----------------------|-----------------|-----------------|
| Dixie | D5844 | D5845 |
| Hubbell (Chance) | 5844 | 5819 |
| Joslyn | J1600 | - |
| Kortick | K1454 | K1465 |
| Line Hardware | - | DAP-17 |
| MacLean (Continental) | U4117 | - |

cu-1
July 2004

cu - Brace, crossarm, wood

| | | |
|--------------------------------|-----------|-----------|
| Span, inches | 60 | 60 |
| Drop, inches | 18 | 30 |
| | | |
| Aluma-Form | 6018 | 6030 |
| Brooks | 446-60-18 | 446-60-30 |
| Dis-Tran | DT-60R | - |
| Hatheway Patterson | 320-R | 325-R |
| Hughes Brothers | 2045-CC | 2045-D |
| Joslyn | J4760R | J4730RW |
| Pennington | 15018 | 15030 |
| Utilities Structures Eng. Inc. | CU-60-18 | CU-60-30 |

Braces listed below have 26-inch hole spacing. They are to be used in place of the flat steel braces previously listed on page h.

| | |
|--------------------|-------|
| Aluma-Form | AF626 |
| Brooks | 58128 |
| Hatheway Patterson | 7026 |
| Hughes Brothers | 2023 |
| Joslyn | J5526 |

Brace, crossarm, fiber reinforced plastic

| | |
|-----------------------|--------|
| Dulmison | CAB-28 |
| Hughes Brothers | 533 |
| MacLean (Continental) | CRB-28 |

cx - Splice, oval tube

Copper

| Conductor Size: | 0 x 7 | 2 x 3 | 4 | 6 |
|----------------------|-------|-------|-----|-----|
| National Tel. Supply | 464 | 463 | 459 | 457 |

Copperweld-Copper

| Conductor Size: | 6A | 8A |
|----------------------|-----|-----|
| National Tel. Supply | 460 | 459 |

cy-1
July 2004

cy - Splice, Compression

ACSR

| Conductor Size | Alcoa | Blackburn | Burndy |
|-------------------|-------------|-----------|-------------|
| 4 6/1 | 2-piece | | "Unisplice" |
| 4 7/1 | Order | Type RC | (1-piece) |
| 2 6/1 | by | 1-piece | or Y-S |
| 2 7/1 | Conductor | Order | (2-piece) |
| 1/0 | Size | by | Order by |
| 2/0 | and | Conductor | Conductor |
| 3/0 | Stranding | Size | Size and |
| 4/0 | " | and | Stranding |
| | | Stranding | |
| 266.8 kcmil 18/1 | | | |
| 336.4 kcmil 18/1 | | | |
| 477 kcmil 18/1 | | | |
| 266.8 kcmil 26/7 | 2-piece | | 2-piece |
| 336.4 kcmil 26/7 | Compression | | Type YTS |
| 477 kcmil 26/7 | Alloy Type | | " |
| 556.6 kcmil 26/7 | CJ | | " |
| 795 kcmil 26/7 | | | " |
| 954 kcmil 54/7 | | | " |

| Conductor Size | Hubbell(Anderson) | Hubbell (Fargo) | Kearney/Cooper Power Systems | |
|-------------------|-------------------|-----------------|------------------------------|-------------|
| | VC-36R | | 2 pc | 1 pc |
| 4 6/1 | VC-36R | - | - | OH4-61-71AS |
| 4 7/1 | VC-36R | - | - | OH4-61-71AS |
| 2 6/1 | VC-36R | - | - | OH2-61-71AS |
| 2 7/1 | VC-50R | - | - | OH2-61-71AS |
| 1/0 | VC-50R | TJA-8129 | OH1/0-61A | OH1/0-61AS |
| 2/0 | VC-61R | TJA-7729 | OHR2/0-61A | - |
| 3/0 | VC-61R | TJA-7829 | OHR3/0-61A | - |
| 4/0 | - | TJA-7929 | HR4/0-61A | - |
| | VC-80-R | | | |
| 266.8 kcmil 18/1 | VC-80-R | - | - | - |
| 336.4 kcmil 18/1 | VC-90-R | - | - | - |
| 477 kcmil 18/1 | - | - | - | - |
| | VC-831-1-RM | | | |
| 266.8 kcmil 26/7 | VC-831-1-RM | Uni-grip | HR-266-267A | - |
| 336.4 kcmil 26/7 | VC-832-2-RM | one die | HR336-267A | - |
| 477 kcmil 26/7 | VC-833-3-RM | system | HR-477-267A | - |
| 556.5 kcmil 26/7 | VC-835-4RM | Order by | HR-556-267A | - |
| 795 kcmil 26.7 | VC-835-4RM | conductor size | - | - |
| 954 kcmil 54/7 | - | and stranding | - | - |

NOTE: These splices are acceptable when installed with tools and dies in accordance with the splice manufacturer's recommendations.

cy - Splice, Compression

ACSR

| Conductor Size | Nat. Tel. Supply | Homac | ESP |
|------------------|------------------|-------------|-----------|
| 4 6/1 | "Nicopress" | "Tension | FTR-4 |
| 4 7/1 | (1-pc. or 2-pc.) | splicer" | FTR-4 |
| 2 6/1 | Order by Conduc- | (1-piece or | FTR-2 |
| 2 7/1 | tor Size and | 2-piece | FTR-2.5 |
| 1/0 | Stranding | Order by | FTR-1/0 |
| 2/0 | 2-pc. | Conductor | FTR-2/0.5 |
| 3/0 | " | Size and | FTR-3/0 |
| 4/0 | " | Stranding | FTR-4/0 |
| 266.8 kcmil 26/7 | " | 2-pc. | - |
| 336.4 kcmil 26/7 | " | " | - |
| 477 kcmil 26/7 | " | " | - |
| 556.5 kcmil 26/7 | " | " | - |
| 795 kcmil 26/7 | - | - | - |
| 954 kcmil 54/7 | - | - | - |

NOTE: These splices are acceptable when installed with tools and dies in accordance with the splice manufacturer's recommendations.

Splice, Compression

Copper and Copperweld-Copper

| <u>Conductor Size</u> | <u>Burndy</u> | <u>Homac</u> | <u>Hubbell (Anderson)</u> | <u>Kearney/Cooper Power Systems</u> | <u>National Tel. Supply</u> |
|---------------------------|---------------|--------------|-------------------------------|---|-----------------------------|
| 6 cu | YDS6W | J2C3 | VCC-28 | OH6C | 1-162/J |
| 4 cu | YDS4W | L2C5 | VCC-28 | OH4C | 1-204/P |
| 2 x 3 cu | YDS2C-3 | S2C7 | - | OH2-3CX | 1-258/3X |
| 0 x 7 cu | YDS25 | U2C9 | - | OH1-7C | 1-325/7F6 |
| 8A CWC | YDS8KT | L2E1 | VCC-28 | OHR8ACW | 1-8A-P |
| 6A CWC | YDS6KT | L2E3 | VCC-28 | OHR6ACW | 1-6A-P |
| 4A CWC | YDS4KT | Q2E5 | VCC-37 | OHR4ACW | 1-4A-X |
| 2A CWC | - | U2E7 | VCC-43 | - | - |

NOTE: These splices are acceptable when installed with tools and dies in accordance with the splice manufacturer's recommendations.

cy - Splice, compression
(one-piece)

(For 6201 and 5005 Aluminum Alloy Conductors)

| Conductor Size | Burndy | Blackburn | Homac |
|----------------|--|--|---|
| #4 thru 4/0 | "Unisplice" | Type RC | "Tension Splicer" |
| | Order by Conductor Size and Stranding | Order by Conductor Size and Stranding | Order by Conductor Size and Stranding |

| Conductor Size | Hubbell (Anderson) | ESP |
|----------------|--|-----------------------------|
| #4 thru 4/0 | Type VC-R | Type FTR |
| | Order by Conductor Size and Stranding | order by size and stranding |

NOTE: These splices are acceptable when installed with tools and dies in accordance with the splice manufacturer's recommendations.

cy - Splice, compression

1-piece splice for ACSR

| Manufacturer | Conditions |
|--------------------------------|-----------------------|
| <u>*ALCOA</u> "Jiffy Joint" | To obtain experience. |

1-piece splice for AWAC

Burndy

| | |
|---|-----------------------|
| AWAC 4-4/3 YDS7M10T AWAC 2-4/3 YDS7M9T AWAC 1/0-4/3 YDS7M7T | To obtain experience. |
|---|-----------------------|

*Satisfactory for use with 6201 and 5005 all aluminum alloy conductor through 4/0 and 19 strand conductors of sizes 266.8 kcmil and 477 kcmil.

NOTE: These splices are acceptable when installed using tools and dies in ccordance with the splice manufacturer's recommendations.

cz - Splice for Steel Strand (Overhead Ground Wire)

Compression

Single Sleeve Only

| | High Strength Steel | | Extra High Strength | | | Aluminum Clad Steel | | |
|-----------------------------------|----------------------|--------------|---------------------|-------------|--------------|---------------------|--------------------|--------------------|
| | <u>3/8"</u> | <u>7/16"</u> | <u>5/16"</u> | <u>3/8"</u> | <u>7/16"</u> | <u>7 No. 9 AWG</u> | <u>7 No. 8 AWG</u> | <u>7 No. 7 AWG</u> |
| Alcoa | | | | 4914.386 | 4916.453 | | | |
| Burndy | YTS375E | YTS438E | | | | YDS7M9T | YDS7M8T | YDS7M7T |
| Hubbell (Fargo) | 811425 | 811630 | 811222 | 811425 | 811630 | 811425 | 811427 | 811630 |
| Kearney | HR-3/8-3-7S | | | | | | | |
| National Tel. Supply | 5-7/12OG92 | 5-7/145J22 | | | | | | |
| <u>Steel and Aluminum Sleeves</u> | | | | | | | | |
| Homac | 28414 (Two piece) | | | | | | | |
| <u>Automatic</u> | | | | | | | | |
| MacLean (Reliable) | 5002 | 5043 | 5041 | 5042 | 5043 | 5042 | 5042 | 5043 |
| <u>Bolted Type</u> | | | | | | | | |
| Electroline | GD-537 | | | | | | | |
| <u>Formed Type</u> | | | | | | | | |
| Helical Line Products | HS-310-3/8" | HS-311-7/16" | | | | | | |
| Hubbell (Chance) | 10SS 3/8C | 16SS 7/16C | 6SS 5/16C | 10SS 3/8C | 16SS 7/16C | | | |

da-1
July 2004

da - Bracket, insulated

| | Bracket without Insulator | Bracket with 1-3/4" Spool Insulator | Bracket with 3" Spool Insulator |
|------------------|------------------------------|--|------------------------------------|
| Dixie | D0327 | - | - |
| Hubbell (Chance) | 0327 | 0327-C909-1032 | 0327-C909-1304 |
| Hughes Brothers | 1077LI | 1077SI | 1077I |
| Joslyn | J1300 | - | - |
| Kortick | K9278 | K9081 | K9082 |

dh - Ground, pole

(For system grounds, see ground rods on page ai)

Manufacturer

Catalog Number

Galvanized Steel Plate With Insulated Copper Lead

(For connecting to a copper or aluminum ground wire above ground.)

Line Hardware

PGPS-56CL8

Galvanized Steel Plate with Connector

(For connecting to a galvanized iron ground wire)

Line Hardware

PGPS-56C

Copper Plate

Blackburn

GP-100

Drabco

D 101

Eritech

EGP-100

Homac

5575

Joslyn

J9196

Line Hardware

PGPC-56

dl-1
July 2004

dl - Pipe Spacer

3/4" diameter x 1-1/2" length

| <u>Manufacturer</u> | <u>Catalog Number</u> |
|-----------------------|-----------------------|
| Dixie | D2031 |
| Hubbell (Chance) | 2237 |
| Joslyn | J2031 |
| MacLean (Continental) | U36695 |

dm - Bracket, transformer
(For cluster mounting of two or three transformers on pole)

| Manufacturer | Transformer Size, kVA | Band Type | Through Bolt Type |
|----------------------------|-----------------------------|-----------------------|--|
| Aluma-Form | 3-50 75-100 | 6M3-6 15M3-6 | 3MW-24-M 11MW-24 |
| Barfield Manufacturing Co. | 3-50 75-100 | BMAC-366 BMAC-3156 | - - |
| Dixie | 3-25 37-1/2-50 75-100 | - - - | DW-50 DW-50 DW-167 |
| Hubbell (Chance) | 3-50 75-100 | C6M3-6 C15M3-6 | - - |
| Hughs | 3-25 37-1/2-50 75-100 | - - - | 3021 3020 3020 with adapter plates and back plate |
| Joslyn | 3-25 37-1/2-50 75-100 | - - - | J6865 J6864 J6866 |
| Turner | 3-25 37-1/2-50 75-100 | - - - | 305-25 305-100 305-100 |

For mounting of two transformers

| | | | |
|------------------|---------------|--------|------------------|
| Aluma-Form | 3-100 3-50 | - - | DM-4M2 DM-2M2 |
| Hubbell (Chance) | 3-100 | - | C212-0001 |
| Hughes | 3-50 | - | 3022 |
| Turner | 3-50 | - | 205-25 |

dp - Clamp, ground wire

Transmission

For grounding steel towers and substation structures

Bolt Included

(For use with copper ground wires)

| <u>Manufacturer</u> | <u>Catalog Number</u> |
|---------------------|-----------------------|
| AMP | 81416-3 |
| Penn-Union | GH-30-C-A1 |
| Royal Switchgear | 12202-T (Type LCS) |
| Square D | GC-143A--OZ |

For use in: Pole Grounding Assembly TM-9
Capacitor Assemblies M9-11, M9-12 and M9-13

| <u>Manufacturer</u> | <u>For 5/8" Bolt</u> | <u>For 3/4" Bolt</u> |
|-----------------------|----------------------|----------------------|
| Dixie | D-5452 | - |
| Joslyn | J1163 | J1164 |
| MacLean (Continental) | SBL-33 | - |

dq - Eye Screw, Elliptical

For use in deadending triplex type service cable, Drawing K10C.

| Manufacturer | Catalog Number |
|--------------|----------------|
| Joslyn | J8930 |

dr-1
July 2004

dr - Clevis, conduit, insulated

For use in deadending triplex service cable, Drawing K16C.

Applicable Specifications: "RUS Specifications for Insulated Conduit Clevises and Conduit Wire-holders
for Pipe Mast Deadends," D-16

Joslyn

J0311*

*Insulator not included. See page cm for spool insulator.

ds - Wireholder, conduit

For use in deadending open wire services on pipe masts, Drawing K17

Applicable Specifications: "RUS Specifications for Insulated Conduit Clevises and Conduit Wireholders,"
D-16

| <u>Manufacturer</u> | <u>Catalog Number</u> |
|---------------------|-----------------------|
| Dixie | D-4010 |
| Hubbell (Chance) | C207-0075 |

Conditional List
ds(1)
July 2004

ds - Wireholder, conduit

| <u>Manufacturer</u> | <u>Conditions</u> |
|---------------------------------------|-----------------------|
| <u>Joslyn</u> J0588Z (nylon alloy) | To obtain experience. |

dt - Deadend, service

For deadending triplex type service cable, Drawing K10C.

| Manufacturer | ACSR Size | Catalog Number | |
|----------------------------|-----------|----------------|-------------|
| | | Wedge Type | Formed Type |
| Blackburn | 4 | W62-1 | - |
| Dulmison | 4 | - | SG0570 |
| | 2 | - | SG0735 |
| | 1/0 | - | SG0915 |
| | 2/0 | - | SG1020 |
| Helical Line Products | 4 | - | HSG-514 |
| | 2 | - | HSG-518 |
| | 1/0 | - | HSG-522 |
| MacLean (Reliable) | 4 | 7195 | - |
| | 2 | 7187 | - |
| | 1/0 | 7287 | - |
| Penn-Union | 4 | WDC-2S | - |
| Preformed Line Products | 4 | - | SG-4502 |
| | 2 | - | SG-4504 |
| | 1/0 | - | SG-4506 |
| | 2/0 | - | SG-4507 |
| | 3/0 | - | SG-4508 |
| | 4/0 | - | SG4509 |

du-1
July 2004

du - Link, Extension

DISTRIBUTION

| <u>Manufacturer</u> | <u>Catalog Number</u> |
|-----------------------|---------------------------|
| Joslyn (Flagg) | PA319 |
| Hubbell (Chance) | C207-0112 |
| MacLean (Bethea) | LCE-14 |
| MacLean (Continental) | CEL-14 |

TRANSMISSION

(25,000 lbs. min. strength)

| | |
|------------------|---------------|
| Joslyn | J26082 |
| MacLean (Bethea) | ASM 7209-I-BC |

Guy Extension Link
(For "H" Structure)

| <u>Manufacturer</u> | <u>One Guy Attachment</u> | <u>Two Guy Attachment</u> |
|---------------------|---------------------------|---------------------------|
| Joslyn | J22421 | J26025 |

NOTE: The distribution extension links may be substituted for anchor shackle (Item bo), eye bolt (Item o) and eye nut (Item aa) for both small and large conductor drawings shown in RUS Form 803 and RUS Bulletin 50-3 at the option of the owner.

du - Connecting Links for Pole Bands

Conditions - To obtain experience.in conjunction with pole bands [Item fv(1)]

For Use With Medium Duty Pole Bands

| <u>Manufacturer</u> | <u>Link to Insulators</u> | <u>Size</u> | <u>Minimum Strength Rating</u> |
|---------------------|-------------------------------|----------------|------------------------------------|
| Hughes Bros. | 3176 | 3/8"x3"x9-1/2" | 25,000 lbs. |
| Joslyn | J26034 | 3/8"x3"x9-1/2" | 25,000 lbs. |

Link to Guy

| | | | |
|--------------|--------|----------------|-------------|
| Hughes Bros. | 3154 | 3/8"x2"x9-1/2" | 36,000 lbs. |
| Joslyn | J26035 | 3/8"x3"x9-1/2" | 36,000 lbs. |

For Use With Heavy Duty Pole bands

| <u>Manufacturer</u> | <u>Link to Insulators</u> | <u>Size</u> | <u>Minimum Strength Rating</u> |
|---------------------|-------------------------------|----------------|------------------------------------|
| Hughes Bros. | 3157 | 3/8"x3"x12" | 36,000 lbs. |
| Joslyn | J26035 - 2 | 3/8"x3"x9-1/2" | 36,000 lbs. |

Link to Guy

| | | | |
|--------------|--------|-------------|-------------|
| Hughes Bros. | 3157 | 3/8"x3"x12" | 51,000 lbs. |
| Joslyn | J26037 | 1/2"x3"x12" | 51,000 lbs. |

dy-1
July 2004

dy - Bolt, eye, double arming

Applicable Specification: ANSI C135.4, "Standards for Galvanized Ferrous Eye Bolts and Nuts for Overhead Line Construction."

| | |
|------------------|-------------------------------------|
| Applicable Sizes | 5/8 inch, 14 through 26 inch length |
| | 3/4 inch, 14 through 26 inch length |

The following manufacturers have shown compliance with the applicable specifications:

Dixie Electrical Manufacturing Company
Hubbell (Chance)
Joslyn Manufacturing Company
Kortick Manufacturing Company
MacLean (Continental)

dz - Clip, Guy Wire

| Manufacturer | 5/16" | 3/8" | 7/16" | 1/2" |
|-----------------------|-------|-------|-------|-------|
| Hubbell (Chance) | 6453 | 6454 | 6455 | 6456 |
| MacLean (Continental) | U4953 | U4954 | U4955 | U4956 |

ea-1
July 2004

ea - Insulator and stud, post type, vertical

DISTRIBUTION (RUS Minimum Requirements)

| | | | |
|------------------------------|----------|----------|-----------|
| System voltage, kV | 12.5/7.2 | 12.5/7.2 | 24.9/14.4 |
| Leakage, inches | 7-1/2 | 10 | 15 |
| Cantilever strength (pounds) | 1875 | 1875 | 1875 |
| Flashover, dry, kV | 65 | 70 | 95 |
| Flashover, wet, kV | 40 | 50 | 65 |

Lapp

| | | | |
|-------------|-------|-------|-------|
| 7" Stud | 4415P | 4420P | 4427P |
| 1-3/4" Stud | 4315P | 4320P | 4327P |

Newell Porcelain

| | | | |
|-------------|---|------------|------------|
| 7" Stud | - | 43570-7040 | 47101-7040 |
| 1-3/4" Stud | - | 43570-7010 | 47101-7010 |

Porcelain Products (Knox)

| | | | |
|-------------|-----------|-----------|-----------|
| 7" Stud | 5115-6510 | 5120-6510 | 5127-6510 |
| 1-3/4" Stud | 5115-6500 | 5120-6500 | 5127-6500 |

DISTRIBUTION or TRANSMISSION

| | | | |
|--------------------|------|------|------|
| ANSI Class | 57-2 | 57-3 | 57-4 |
| System voltage, kV | 22 | 34.5 | 46 |

Lapp

| | | | |
|-------------|------|------|------|
| 7" Stud | 9435 | 9445 | 9455 |
| 1-3/4" Stud | 9335 | 9345 | 9355 |

Newell Porcelain

| | | | |
|-------------|------------|------------|------------|
| 7" Stud | 37620-7040 | 41640-7040 | 41650-7040 |
| 1-3/4" Stud | 37620-7010 | 41640-7010 | 41650-7010 |

Porcelain Products (Knox)

| | | | |
|-------------|-----------|-----------|---|
| 7" Stud | 5135-6512 | 5145-6512 | - |
| 1-3/4" Stud | 5135-6502 | 5145-6502 | - |

ea - Insulators, horizontal post type

| Manufacturer | 34.5 kV | 69 kV | 115 kV |
|-------------------------|------------|--------------------------|---------|
| Lapp | F-4745 | F-4788 | F-70147 |
| Locke | - | LS025I3 | LS050I3 |
| Newell Porcelain | 43740-7700 | 43790-7700 47043-7700 | - |
| Victor Insulators, Inc. | 62356 | 62359 | - |

Conditional List
ea(1)
July 2004

ea - Insulator, post type

| <u>Manufacturer</u> | <u>Conditions</u> |
|---|-----------------------|
| <u>Victor Insulators, Inc.</u> 2120 (12.5/7.2 kV) 2127 (24.9/14.4 kV) 62055 (22 kV) 62056 (34.5 kV) | To obtain experience. |

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Conditional List
ea(2)
March 3, 2005

ea - Insulator, post type
(Polymer)

| Manufacturer | Conditions |
|--|-----------------------|
| <u>K-Line</u> | |
| <u>Vertical post insulators</u> | To obtain experience. |
| KL 15STFL (12.5/7.2 kV, with 7" Stud) | |
| KL 15STFS (12.5/7.2 kV, with 1-3/4" Stud) | |
| KL 28STFL (24.9/14.4 kV, with 7" Stud) | |
| KL 28STFS (24.9/14.4 kV, with 1-3/4" Stud) | |
| KL 35STFL (ANSI Class 51-3F, with 7" Stud) | |
| KL 35STFS (ANSI Class 51-3F, with 1-3/4" Stud) | |
| KL 46STFL (ANSI Class 51-4F, with 7" Stud) | |
| KL 46STFS (ANSI Class 51-4F, with 1-3/4" Stud) | |
| <u>Horizontal post insulators</u> | |
| KL 46SHG (34.5 kV) | |

eb - Bracket, Pole Top
For Post type Insulators

DISTRIBUTION

| | |
|--|------------|
| Hubbell (Anderson) (14.4 or 7.2 kV) | 84324-2000 |
| Hubbell (Chance) (14.4 or 7.2 kV) | 1B4 |
| Joslyn (Flagg) (14.4 or 7.2 kV) | P526 |
| Lapp (Line Ware) (14.4 or 7.2 kV) | 304043 |
| Line Hardware (14.4 or 7.2 kV) | PTIB-375A |
| MacLean (Continental) (14.4 or 7.2 kV) | PTB-55-8 |
| Universal Electric (14.4 or 7.2 kV) | PT-8R |

TRANSMISSION

| | |
|-----------------------|---------|
| Hubbell (Chance) | 1B4 |
| Joslyn (Flagg) | P532 |
| Lapp (Line Ware) | 304044 |
| MacLean (Continental) | PTB-66H |

ec-1
July 2004

ec - Bracket, Offset Neutral

| | |
|------------------|-----------|
| Dixie | D-2353 |
| Hubbell (Chance) | C206-0004 |
| Joslyn | J2352 |

ed - Support, overhead ground wire

Applicable Specifications: "RUS Specifications for Overhead Ground Wire Support Brackets," T-2

| Pole top diameter, inches | 6-8 | 8-10 | 10-12 |
|---------------------------|--------|---------|---------|
| Dixie | - | - | D7760 |
| Hubbell (Chance) | - | 5432 | 5432 |
| Hughes Brothers | - | 2859-12 | 2859-14 |
| Joslyn | - | J6394 | J6395 |
| Kortick | K3580 | K3581 | K3582 |
| MacLean (Continental) | UC1238 | UC1239 | UC1240 |

ef-1
July 2004

ef - Bolt, clevis

Applicable Specifications: "RUS Specifications for Clevis Bolts," DT-7

| | <u>Dia. (Inches)</u> | <u>8"</u> | <u>10"</u> | <u>12"</u> | <u>14"</u> |
|------------------|----------------------|-----------|------------|------------|------------|
| Hubbell (Chance) | 5/8 | 15808 | 15810 | 15812 | 15814 |
| | 3/4 | 15828 | 15830 | 15832 | 15834 |
| Joslyn | 5/8 | J7808 | J7810 | J7812 | J7814 |

eg - Plate, crossarm reinforcing

TRANSMISSION

For 5-5/8" x 7-3/8" crossarm

| Manufacturer | Catalog Number |
|-----------------------|----------------|
| Hubbell (Chance) | 4047 |
| Hughes Brothers | 1113.88 |
| MacLean (Continental) | U3838 |

eh-1
July 2004

eh - Hook, ball

| Manufacturer | Catalog Number |
|--------------------|----------------|
| Joslyn (Flagg) | 13400 |
| Hubbell (Anderson) | HB-30 |
| Lapp | 7055 |
| Lindsey | 3310 |
| Line Hardware | BH-30 |
| MacLean (Bethea) | BH-5 |

ei - Clamps, suspension with socket eye
ACSR with Straight or Formed Armor Rods

| | AWG | | | <u>kcmil</u> | | | | | | |
|--------------------|-----------------------------|-----|----------|--------------|-------|-----|-------|-----|-----|--|
| | 1/0 & 2/0 | 3/0 | 4/0 | 266.8 | 336.4 | 477 | 556.5 | 795 | 954 | |
| | <u>Iron or Steel Clamps</u> | | | | | | | | | |
| Hubbell (Anderson) | MS-82-S | -- | MS-104-S | MS-104-S | -- | -- | -- | -- | -- | |
| Hubbell (Chance) | FGW4S | -- | -- | -- | -- | -- | -- | -- | -- | |
| Lapp | 305743S | -- | -- | -- | -- | -- | -- | -- | -- | |
| MacLean (Bethea) | FS-83-S | -- | -- | -- | -- | -- | -- | -- | -- | |

ACSR with Straight or Formed Armor Rods

| | AWG | | kcmil | | | | | |
|--------------------|-----------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| | 1/0 & 2/0 | 3/0 & 4/0 | 266.8 | 336.4 | 477 | 556.5 | 795 | 954 |
| | <u>Aluminum Alloy Clamp</u> | | | | | | | |
| C & R | CRSC-1S | CRSC-2S | CRSC-3S | CRSC-3S | -- | -- | -- | -- |
| Dulmison | -- | HSU | HSU | HSU | HSU | HSU | HSU | HSU |
| Hubbell (Anderson) | HAS-85-S | HAS-104-S | HAS-104-S | HAS-118-S | HAS-139-S | HAS-147-S | HAS-182-S | HAS-182-S |
| Lapp | 306029S | 306030S | 306030S | 306031S | 306032S | -- | -- | -- |
| *Preformed | -- | AGS | AGS | AGS | AGS | AGS | AGS | AGS |
| MacLean (Bethea) | LS-1-S | LS-2-S | LS-2-S | LS-3-S | LS-4-S | LS-6-S | LS-7-S | LS-8-S |

*Clevis type available.

ej-1
July 2004

ej - Clamps, deadend with socket eye

ACSR

| | AWG | kcmil | | | | | |
|--------------------|------------|---|------------|----------|----------|------------|------------|
| | 2/0 to 4/0 | 266.8 | 336.4 | 477 | 556.5 | 795 | 954 |
| | | <u>Iron or Steel Clamps (requires armor tape or liner)</u> | | | | | |
| Hubbell (Anderson) | - | 80445-2000 | 80445-2000 | - | - | - | - |
| | | <u>Aluminum Alloy Clamps (do not require armor tape or liner)</u> | | | | | |
| Anderson/Hubbell | SD-57-S | SD-70-S | SD-70-S | SD-86-S | SD-86S | -- | -- |
| C & R | CR-10-60S | CR-20-60S | CR-20-60S | -- | -- | -- | -- |
| Lapp | 305757S | 305758S | 305759S | 305760S | -- | -- | -- |
| MacLean (Bethea) | ADE-21-S | ADE-22-S | ADE-23-S | ADE-24-S | ADE-24-S | ADE-2526-S | ADE-2526-S |

NOTE: When used with clevis-type insulators for large conductors on distribution lines, order clamp with clevis eye.

ek - Locknuts

| | <u>MF Type</u> | | | | |
|-----------------------|----------------|------------|------------|------------|------------|
| For Bolt Diam., in.: | <u>3/8</u> | <u>1/2</u> | <u>5/8</u> | <u>3/4</u> | <u>7/8</u> |
| Dixie | D3510 | D3511 | D3512 | D3513 | -- |
| Hubbell (Chance) | 3510 | 3511 | 3512 | 3513 | 3514 |
| Hughes Brothers | MF30 | MF50 | MF60 | MF70 | -- |
| Joslyn | J8581 | J8582 | J8583 | J8584 | J8584-1/2 |
| Kortick | K1065 | K1066 | K1067 | K1068 | -- |
| Line Hardware | SLN38 | SLN50 | SLN58 | SLN34 | SLN78 |
| MacLean (Continental) | U4920 | U4921 | U4922 | U4923 | U4924 |

el-1
July 2004

el - Sectionalizer

| Manufacturer | Type |
|----------------------|---|
| Cooper Power Systems | GH (with crossarm mounting bracket KA27G) |

el - Sectionalizer

| Manufacturer | Conditions |
|--|---|
| <u>Cooper Power Systems</u> | |
| Sectionalizer, three-phase Type GN3 | To obtain experience. |
| Sectionalizer with 125 kV BIL accessory Type GH, 15 kV, single phase | 1. To obtain experience. 2. For use on single-phase taps of 24.9/14.4 kV multi-grounded wye systems. |
| *Sectionalizer, three-phase Type GN3E 14.4 kV, 200 amp max. | To obtain experience. |
| *Sectionalizer, three-phase Types GV and GVC 14.4 kV, 400 amp. max. | To obtain experience. |
| *Sectionalizer, three-phase Types GW and GWC 34.5 kV, 400 amp. max. | To obtain experience. |
| <u>General Electric</u> | |
| Sectionalizer, single-phase cutout-type - 15 kV and 25 kV Model 9F41F | To obtain experience. |
| <u>Hubbell (Chance)</u> | |
| Sectionalizer, single-phase Type CRS single-phase, Cutout type 15 kV, 95 kV BIL 200 amp max. 27 kV, 125 kV BIL 200 amp max. 38 kV, 150 kV BIL 200 amp max. | To obtain experience. |
| <u>Joslyn</u> | |
| Sectionalizer, three-phase, 15 kV, 400 and 600 amperes 25 kV, 600 amperes Model VBM with VT or RS control | To obtain experience. |

*NOTE: Ratings greater than 100 ampere for 12.5/7.2 kV application and greater than 200 ampere for 24.9/14.4 kV application are acceptable only with ground trip device.

NOTE: Cutout type sectionalizers may also be used with cutout frames listed on pages af-1 and ax-1. Consult manufacturer for application.

em-1
July 2004

em - Brace, crossarm, special
(angle alley arm)

DISTRIBUTION

15" span, 14" drop; 1-1/2" x 3/16"

| | |
|-----------------------|--------|
| Dixie | D17939 |
| Kortick | K1978 |
| MacLean (Continental) | U5514 |

TRANSMISSION

2'-6" span x 1'-8" drop 3'-6" span x 2'-3" drop

| | <u>1-3/4" x 3/16"</u> | <u>1-3/4" x 3/16"</u> |
|-----------------------|-----------------------|-----------------------|
| Hubbell (Chance) | - | 6999 |
| Hughes Brothers | AS-2309-B | AS-2309-A |
| Kortick | K1975 | K1976 |
| MacLean (Continental) | U5509 | U5510 |

eq - Narrow Profile Brackets and Special Arm Assemblies

METAL BRACKETS

| Manufacturer | Conditions |
|--|--|
| <u>Dixie</u> Deadend bracket assembly D21142 for 12.5/7.2 kV Deadend bracket assembly D21144 for 24.9/14.4 kV | 1. To obtain experience. 2. For use only in scenic areas and locations where right-of-way is limited. 3. Not to be used where conductor galloping may be expected. |
| <u>Hubbell (Anderson)</u> Standoff bracket, COB-E-180-TGL | Same as above. |
| <u>Hubbell (Chance)</u> Single post insulator brackets C206-0209 for 12.5/7.2 kV construction only C206-0010 for 24.9/14.4 kV construction Deadend bracket assembly, C206-0179 Deadend bracket assembly, C206-0211 for 24.9/14.4 kV construction | Same as above. |
| <u>Joslyn (Flagg)</u> Standoff bracket, PA619B | Same as above. |
| <u>MacLean (Continental)</u> Standoff bracket IACB-18-5 | Same as above. |

eq - Narrow Profile Brackets and Special Arm Assemblies

METAL BRACKETS

| <u>Manufacturer</u> | <u>Conditions</u> |
|---|--|
| <u>Joslyn</u> Single post insulator brackets 24840.1, for 12.5/7.2 kV construction only 24840.2, for 24.9/14.4 kV construction | 1. To obtain experience. 2. For use only in scenic areas and locations where right-of-way is limited. 3. Not to be used where conductor galloping may be expected. |
| <u>MacLean (Bethea)</u> Single post insulator bracket, HBF-10-9-GC Standoff bracket VIB3-18-GC | Same as above. |
| <u>Universal Electric</u> Single post insulator bracket, SAB-3-18-GC | Same as above. |

eq - Narrow Profile Brackets and Special Arm Assemblies

FIBERGLASS REINFORCED PLASTIC
For 12.5/7.2 kV

| Manufacturer | Conditions |
|---|--|
| <u>Hubbell (Chance)</u> Two-phase pin bracket 2SBM36VV4 Standoff insulator 1SBM13H1 Deadend arm DEM36SP | 1. To obtain experience. 2. For use only in scenic areas and locations where right-of-way is limited. 3. Not to be used where conductor galloping may be expected. 4. Not to be used in contaminated atmospheres. |
| <u>MacLean (Continental)</u> Two-phase pin bracket GPB2-568M-36V Two-phase angle bracket GPB2-568M-36E Standoff insulator GPB-58M-13 Standoff insulator GPB-58M-18 Deadend arm GDEA-58-3.0-36-2E Suspension bracket GPB-58M-18E | Same as above. |
| Single Phase Straight Pin Bracket, 15 Degrees AD15-SS-13 AD15-SS-18 | Same as above. |
| Two-phase pin bracket 6742-36P Standoff insulator bracket 6745-13P Standoff insulator bracket 6745-18P | Same as above. |

eq - Narrow Profile Brackets and Special Arm Assemblies

FIBERGLASS REINFORCED PLASTIC
For 12.5/7.2 kV

| Manufacturer | Conditions |
|---|--|
| <u>Joslyn (Flagg)</u> Two phase angle bracket 7561-336E Two phase pin bracket 7561-436 Standoff insulator 7561-012 Standoff insulator 7561-018 Suspension bracket 7561-818 Standoff bracket 7561-218 Deadend arm 7554-636-4E | 1. To obtain experience. 2. For use only in scenic areas and locations where right-of-way is limited. 3. Not to be used where conductor galloping may be expected. 4. Not to be used in contaminated atmospheres. |
| <u>Hughes Brothers</u> Two-phase angle bracket 761-36-8 Two-phase pin bracket 813-36 Standoff insulator, 560-13 Standoff insulator, 560-18 Suspension bracket, 615-18 Deadend arm, 540-36 Standoff bracket, 892-18 | Same as above. |

eq - Narrow Profile Brackets and Special Arm Assemblies

FIBERGLASS REINFORCED PLASTIC
For 24.9/14.4 kV

| Manufacturer | Conditions |
|---|--|
| <u>Hubbell (Chance)</u> Two-phase pin bracket 2SBM44VV4 Standoff insulator 1SBM19V4 Deadend arm DEM48SP | 1. To obtain experience. 2. For use only in scenic areas and locations where right-of-way is limited. 3. Not to be used where conductor galloping may be expected. 4. Not to be used in contaminated atmospheres. |
| <u>Joslyn (Flagg)</u> Standoff insulator 7581-120X Standoff insulator 7561-118X Two-phase pin bracket 7561-448X Standoff bracket 7561-218 Deadend arm 7554-648-4E | Same as above. |
| <u>MacLean (Continental)</u> Two-phase pin bracket GPB2-568M-44-V-1.375 Two-phase pin bracket GPB2-558H-48-V-1.375 Standoff insulator GPB-58M-19-V-1.375 Standoff insulator GPB-58H-20-V-1.375 Standoff bracket GPB-5568M-18-GIACB Deadend arm GDEA-58-3.0-48-2E Single Phase Vertical Pin Bracket, 15 Degrees AD15-SV-19T Single Phase Apparatus Bracket, 15 Degrees AA15-STC-18 | Same as above. Same as above. |
| Standoff insulator bracket 6882-18P Standoff Insulator Bracket 6744-19P-1.375 Standoff insulator bracket 6748-20P-1.375 Two-phase pin bracket 6742-44P-1.375 Two-phase pin bracket 6747-48P-1.375 | Same as above. |

eq - Narrow Profile Brackets and Special Arm Assemblies

FIBERGLASS REINFORCED PLASTIC
For 24.9/14.4 kV

| Manufacturer | Conditions |
|---|---|
| <u>Hughes Brothers</u> Deadend arm, 540-48 Standoff insulator, 880-20 Two-phase pin bracket, 883-48 Standoff insulator, 870-19 Two-phase pin bracket, 862-44 Standoff bracket, 892-18 | <ol style="list-style-type: none">1. To obtain experience.2. For use only in scenic areas and locations where right-of-way is limited.3. Not to be used where conductor galloping may be expected.4. Not to be used in contaminated atmospheres. |

eq - Narrow Profile Brackets and Special Arm Assemblies

WOOD ARM ASSEMBLIES

| Manufacturer | Conditions |
|---|--|
| <u>Aluma-Form</u> Arm assembly, 12.5/7.2 kV XA-3812 Arm assembly, 24.9/14.4 kV XA-4214 | 1. To obtain experience. 2. For use only in scenic areas and locations where right-of-way is limited. 3. Not to be used where conductor galloping may be expected. 4. Not to be used as deadend structures. |
| <u>Hughes Brothers</u> Deadend arm, 2890-J complete with braces and attaching hardware, fittings and bolts | 1. To obtain experience. 2. For use only in scenic areas and locations right-of-way is limited. 3. Not to be used where conductor galloping may be expected. |

eq - Narrow Profile Brackets and Special Arm Assemblies

COMBINATION INSULATORS AND BRACKETS

| Manufacturer | Conditions |
|--|---|
| <u>Salisbury</u> Horizontal Post 12.5/7.2 kV, 9561 24.9/14.5 kV, 9562 | <ol style="list-style-type: none">1. To obtain experience.2. For use only in scenic areas and locations where right-of-way is limited.3. Not to be used where conductor galloping may be expected.4. Not to be used in contaminated atmospheres. |

er - Wire Guard, Plastic

See Drawing M-24

| Manufacturer | Type orCatalog Number |
|--------------------------------------|-----------------------|
| Hubbell (Chance) | PFG |
| Hubbell (Fargo) | GM-936 |
| Preformed Line Products (Tree Guard) | PTG |

es - Splice Cover, Plastic

(For use over compression type service connections in place of tape)

| <u>Manufacturer</u> | <u>Type</u> |
|---------------------------------|-------------------|
| Hubbell (Anderson) | Type SEC |
| Kearney/Cooper Power Systems | Type 601 |
| Plastic Engineering & Sales Co. | Wire Splice Cover |
| 3M | PST Series 8420 |
| Virginia Plastics | Type VP |

Splice Cover and Moisture Seal for Secondary Cable Connections
(See Drawings G312 and UM5)

| <u>Manufacturer</u> | <u>Type</u> |
|---------------------|-------------------------------|
| AMP | Sealing & Dielectric Compound |
| Plymouth/Bishop | 10 Plyseal |
| 3M | Scotch Brand #2200 |

Bolted Connector Cover

(For use over bolted type service connections in place of tape)

| <u>Manufacturer</u> | <u>Type</u> |
|---------------------|------------------|
| Hubbell (Anderson) | PTC |
| Hubbell (Fargo) | GA-9000 B Series |

eu - Extension Link
(Fiberglass)
(Distribution)

| Manufacturer | Strength | Catalog Number |
|-----------------------|---|---------------------------------|
| Dulmison | 11,000 lbs. 15,000 lbs. | HSB-1-12* HSB-2X-12 |
| Joslyn (Flagg) | 11,000 lbs. 15,000 lbs. | 150-12EE 150-12EE |
| Hubbell (Anderson) | 10,000 lbs. 15,000 lbs. 16,000 lbs. | GSB1-9* GSB2-12 GS16012EE |
| K-Line | 15,000 lbs. | KL Series |
| MacLean (Continental) | 11,000 lbs. 15,000 lbs. | GEE11-12* GEE15-12 |

*For use with 6" suspension insulators.

Conditional List
ex(1)
July 2004

ex - Splice, formed type

| Manufacturer | Conditions |
|--------------------------------|---|
| <u>Preformed Line Products</u> | |
| Splice for ACSR | To obtain experience. |
| FTS full tension splice | |
| Splice for AWAC | For repair only. |
| LS-0185 for 4-4/3 | To obtain experience. |
| LS-0188 for 2-4/3 | For repair only where alumoweld strands are not |
| LS-0191 for 1/0-4/3 | broken. |

fc - Capacitors, Shunt
12470/7200 Volts

| Manufacturer | Size | 1 Bushing | 2 Bushing | 3 Bushing |
|------------------------------------|----------|-----------|-----------|-----------|
| ABB | 100 kvar | A10009 | A10010 | |
| | 150 kvar | A15009 | A15010 | |
| | 200 kvar | A20009 | A20010 | |
| | 300 kvar | A30009 | A30010 | |
| | 400 kvar | A40009 | A40010 | |
| Cooper Power Systems | 50 kvar | CEP120B6 | CEP120A6 | |
| | 100 kvar | CEP131B6 | CEP131A6 | |
| | 150 kvar | CEP132B6 | CEP132A6 | |
| | 200 kvar | CEP140B6 | CEP140A6 | |
| | 300 kvar | CEP160B6 | CEP160A6 | |
| | 400 kvar | CEP170B6 | CEP170A6 | |
| | 500 kvar | CEP180B6 | CEP180A6 | |
| General Electric Film/Foil Type | 25 kvar | 52L226RC | 52L206RC | |
| | 50 kvar | 51L226RC | 51L206RC | |
| | 100 kvar | 54L226RC | 54L206RC | |
| | 150 kvar | 54L526RC | 54L506RC | |
| | 200 kvar | 58L126RC | 58L106RC | |
| | 300 kvar | 59L226RC | 59L206RC | 59L611RC |

24900/14400 Volts

| Manufacturer | Size | 1 Bushing | 2 Bushing | 3 Bushing |
|------------------------------------|----------|-----------|-----------|-----------|
| ABB | 100 kvar | A10031 | A10032 | |
| | 150 kvar | A15031 | A15032 | |
| | 200 kvar | A20041 | A20042 | |
| | 300 kvar | A30031 | A30032 | |
| | 400 kvar | A40031 | A40032 | |
| Cooper Power Systems | 50 kvar | CEP123B9 | | |
| | 100 kvar | CEP130B9 | | |
| | 150 kvar | CEP139B9 | | |
| | 200 kvar | CEP143B9 | | |
| | 300 kvar | CEP163B9 | | |
| | 400 kvar | CEP173B9 | | |
| | 500 kvar | CEP183B9 | | |
| General Electric Film/Foil Type | 50 kvar | 51L252RC | | |
| | 100 kvar | 54L252RC | | |
| | 150 kvar | 54L552RC | | |
| | 200 kvar | 58L154RC | | |
| | 300 kvar | 59L154RC | | |
| | 400 kvar | 98L154RC | | |

fd - Hangers, Capacitor

Crossarm Mounting

| | 1 unit | 2 units | 3 or 4 units |
|----------------------|-----------|------------|--------------|
| ABB | 85B397G01 | 791C644G01 | 791C644G02 |
| Cooper Power Systems | CH1A1 | CH2A2 | CH4A1 |
| General Electric | 39F41G2 | 39F53 | 39F80G1 |

Pole Mounting

| | Single Phase | Three Phase | |
|----------------------------|--------------------|-------------|-----------|
| | | In Line | Cluster |
| ABB | AL30R (3 units) | (1 Ø units) | |
| | AL60R (6 units) | AL30R | (3 units) |
| | | AL60R | (6 units) |
| | | AL90R | (9 units) |
| | | (3 Ø units) | |
| | | AL13W | (1 unit) |
| | | AL23W | (2 units) |
| | | AL33W | (3 units) |
| | | AL43W | (4 units) |
| | | AL53W | (5 units) |
| Aluma-Form | CR-3* thru CR-6* | CR-3/4* | 3-CR-3/4* |
| General Electric | 39F41G1 (1 unit) | 39F86G1 | |
| | 39F83G1 (3 units) | | |
| Hubbell Power Systems Inc. | CCR-1* Thru CCR-6* | CCR-3/4* | CCR-9/12* |

* Available with oil switch mounting bracket.

fg - Crossarm Saddle

(3-3/4" x 4" with 1-1/4" x 1/4" flange)

| Manufacturer | Catalog Number |
|--------------|----------------|
| Lapp | 10369 |

fi - Connectors, hot line

Over Armor Rods

| <u>Manufacturer</u> | <u>Catalog Number or Series (Al to Al)</u> | <u>Catalog Number or Series (Al to Cu)</u> |
|---------------------|--|--|
| Blackburn | PGH | - |
| Hubbell (Anderson) | AC Series | AC-GP-Series |
| Hubbell (Fargo) | GA-100 Series | GA-100C Series |

fj - Bracket, extension

(For use in mounting circuit reclosers or sectionalizers)

See Drawing VM3-10A

| | Through Bolt Type | Band Type |
|------------|-------------------|-----------|
| Aluma-Form | TBRSM-1, TB2M1-9* | RSM-1 |
| Dixie | D-2359-M | |
| Joslyn | J2357 | |

*For mounting double lug reclosers.

fk - Bracket, circuit recloser or sectionalizer

(For cluster mounting of three circuit reclosers on pole)

| | Cluster Mount | Rack Mount |
|------------|---------------|------------------|
| Aluma-Form | RSM-3, 6M3-9* | 3SPR-66, 3SPR-84 |
| Turner | 695-3 | |

*Suitable for 14.4 and heavy duty 7.2 kV.

fl - Rack, primary metering

(For cluster mounting of primary metering equipment on pole)

| | |
|----------------------------|------------|
| Aluma-Form | PMM Series |
| Barfield Manufacturing Co. | BAPMM6 |
| Turner | 3CT-PT |

fm,fn
July 2004

fm - Extension Bracket for Mounting Apparatus
(Arrester, Cutouts and Potheads for Distribution Pole Mounting)

| Manufacturer | Application Voltage | Single Phase | Three Phase |
|-----------------------|---------------------|-----------------------------|--------------------------|
| Aluma-Form | 12.5/7.2 kV | 1HCA-18 Series | R3CA-48 |
| | 24.9/14.4 kV | 1HCA-C-18 | R3CSA-48 |
| | | WBMA-1 | |
| Barfield Mfg. Co. | 12.5/7.2 kV | BAC 1256 | - |
| | 24.9/14.4 kV | BAC 1710 | - |
| | 12.5/7.2 kV | BACA 126 (double mounting) | - |
| | 24.9/14.4 kV | BACA 1710 (double mounting) | - |
| Dixie | 12.5/7.2 kV | D-1580 | D27211-G |
| | 24.9/14.4 kV | D-1583 | - |
| Hubbell (Anderson) | 12.5/7.2 kV | COB-E-120-TGL | - |
| | 24.9/14.4 kV | ACOB-E-180 | - |
| | | COB-E-180-TGL | - |
| Hubbell (Chance) | 24.9/14.4 kV | C653-1038 | C653-1056 |
| Hughes Brothers | 12.5/7.2 kV | 892-18 | 670-40 |
| | 24.9/14.4 kV | | |
| Joslyn (Flagg) | 12.5/7.2 kV | PA613B | 7510-730 |
| | 24.9/14.4 kV | PA619B | 7510-740-17 |
| Line Hardware | 12.5/7.2 kV | CA-12-3GL | - |
| MacLean (Bethea) | 12.5/7.2 kV | VIB3-18-R1-GC-C | - |
| | | VIB3-12F-GC | - |
| | 24.9/14.4 | VIB3-18-GC | - |
| MacLean (Continental) | 12.5/7.2 kV | IACB-12-5LGE | GPB-3-0-568M-3012-CAT 12 |
| | 24.9/14.4 | IACB-18-5LGE | GPB-3-0-568M-4017-CAT 12 |
| Modern Aluminum | 12.5/7.2 kV | V183-12 | - |
| Universal Electric | 24.9/14.4 kV | SAB-3-18-GC | - |

Note: Above brackets are not suitable for supporting nor deadending distribution line conductors. (See items "eq" for narrow profile bracket and special arm assemblies)

fn - Extension Bracket for Mounting Cutouts

Refer to item fm

fo - Bracket, Transformer Secondary, Insulated

| Manufacturer Insulator | Bracket Without Insulator | Bracket With 2-1/4" Diameter Spool Insulator | Bracket With 3-1/8" Diameter Spool |
|---------------------------|------------------------------|--|--|
| Hubbell (Chance) | - | 9113S | 9114S |
| Joslyn | - | J6765-A | J6765 |
| MacLean (Continental) | U865 | U865/208 | U865/205 |

fp-1
July 2004

fp - Oval Eye Ball
(30,000 lbs; to be used with 52-3 and 52-5 insulators)

| Manufacturer | No. |
|--------------|-----|
|--------------|-----|

(No accepted items at this time)

fq - Laminated Upswept Arms

Applicable Specification: RUS Specification DT-5B
Applicable Drawing: RUS Drawing TUS-1

| Manufacturer | Conditions |
|--|--|
| <u>Hughes Brothers</u> Types: C-4080A (5-1/8" width) C-4080B (5-1/8" width) C-4113A (3-1/8" width) C-4113B (3-1/8" width) | 1. To obtain experience. 2. For use only in scenic and urban areas where right- of-way is limited. |

Conditional List
fs(1)
July 2004

fs - Pole Bearing Plate

| Manufacturer | Conditions |
|---|--|
| <u>Dixie</u> D-6370-GR | 1. To obtain service and operating experience on cross-braced transmission structures. 2. For determining corrosion resistance. 3. For determining structure uplift capability of the pole under various soil and moisture conditions. |
| <u>Joslyn (Flagg)</u> P325B-122 | Same as above. |
| <u>MacLean (Continental)</u> PB-80-7 | Same as above. |

ft - Y-Clevis Ball

| Manufacturer | Catalog Number |
|--------------|----------------|
| Joslyn | BT 3030 |

fu-1
July 2004

fu - Swinging angle bracket

(TRANSMISSION)

Applicable Specification: T-8

Swinging angle bracket with hardware and fittings

| <u>Manufacturer</u> | <u>2' - 0"</u> | <u>3' - 6"</u> | <u>Type #1</u> | <u>Type #2</u> |
|---------------------|----------------|----------------|----------------|----------------|
| Brooks | 64233A | 64233B | X | |
| Hughes Brothers | 2848 | 2848 | X | X |

fv - Guying Attachments
Transmission

Pole Eye Plates*

25,000 lbs. @ 90°/36,000 lbs. @ 45°

| <u>Manufacturer</u> | <u>Single Eye</u> | | <u>Double Eye - 7/8" Bolts</u> |
|-----------------------|-------------------|-------------------|--------------------------------|
| | <u>3/4" Bolts</u> | <u>7/8" Bolts</u> | |
| Joslyn (Flagg) | PX37D | - | PX42 |
| MacLean (Continental) | EPR-66S-12 | - | - |

*Capacity of pole eye plate

fv - Guy Attachments, Pole Bands Attachments, Pole Bands
With Through Bolts for Transmission Lines

Medium Duty Pole Bands

25,000 lbs @ 90°/36,000 lbs @ 45°*

| <u>Manufacturer</u> | <u>Pole Band and Associated Hardware**</u> | <u>Conditions</u> |
|---------------------|--|-----------------------|
| Hughes Bros. | 3108.x-2718.55 | To obtain experience. |
| Joslyn | J25968. x GL | To obtain experience. |

Heavy Duty Pole Bands

36,000 lbs. @90° /51,000 lbs. @ 45°*

| <u>Manufacturer</u> | <u>Pole Band and Associated Hardware**</u> | <u>Conditions</u> |
|---------------------|--|-----------------------|
| Hughes Bros. | 3107.x-2718.55 | To obtain experience. |

* For a guy lead greater than 1/1, capacity of pole band should be derated.

** Associated hardware includes through bolt, band connecting bolts, nuts, grounding clip and lag screws (if any). Connecting links (Item du (1)) of the required strength should be ordered separately from the same manufacturer.

ga - Watthour and Watthour-Demand Meters
1ø, 2 and 3 wire or 2/3 wire 120/240 volts

(Classes 100, 200, 10, and 20)

Self-Contained Types

| Manufacturer | Type of Base | Watthour Meter Type | Mechanical Demand Watthour Type | Thermal Demand Watthour Type | Number of Terminals |
|------------------|-----------------------|---------------------|------------------------------------|---------------------------------|------------------------|
| 1 | 2 | 3 | 4 | 5 | 6 |
| Elster | Bottom Con. Socket | - AB1 | - - | - - | - 4 |
| General Electric | Bottom Con. Socket | I50A I70S | IM50A IM70S | - - | 4 4 |
| Landis & Gyr | Bottom Con. Socket | - MS | - BMS-2S | - TMS | - 4 |
| Schlumberger | Bottom Con. Socket | J5SA J5S* | J5DSA J5DS | - - | - 4 |

Transformer Rated Types

| | | | | | |
|------------------|-----------------------|--------------|----------------|----------|------------------|
| Elster | Bottom Con. Socket | - AB1 | - - | - - | - 5 or 6 |
| General Electric | Bottom Con. Socket | I50A I70S | IM50A IM70S | - - | 5 or 6 5 or 6 |
| Landis & Gyr | Bottom Con. Socket | - MS | - BMS | - TMS | - 5 or 6 |
| Schlumberger | Bottom Con. Socket | J5SA J5S | J5DSA J5DS | - - | - 5 or 6 |

* Type J4ES for Class 320

ga - Watthour and Watthour-Demand Meters
Polyphase 2 element - 3 wire, 240 volts - Delta and 120/208 Volts Network

(Classes 100, 200, 10, and 20)

Self-Contained Types

| Manufacturer 1 | Type of Base 2 | Watthour Meter Type 3 | Mechanical Demand Watthour Type 4 | Thermal Demand Watthour Type 5 | Number of Terminals 6 |
|-------------------|-----------------------|-----------------------------|---|--------------------------------------|-----------------------------|
| Elster | Bottom Con. Socket | - ABS-5 | - - | - - | - - |
| General Electric | Bottom Con. Socket | V62A V62S | VM62A VM62S | - - | 5 - |
| Landis & Gyr | Bottom Con. Socket | - MT012S or 13S | - BMT-12S or 13S | - TMT-12S | - 5 or 8 |
| Schlumberger | Bottom Con. Socket | SL2A SL2S SL12S | SL2DA SL2DS SL12DS | - - | 5 or 8 - |

Transformer Rated Types

| | | | | | |
|------------------|-----------------------|----------------|------------------|------------------|--------|
| Elster | Bottom Con. Socket | ABA-2 ABS-2 | - - | - - | - 8 |
| General Electric | Bottom Con. Socket | V63A V63S | VM63A VM63S | - - | 8 - |
| Landis & Gyr | Bottom Con. Socket | MT-5A MT-5S | BMT-5A BMT-5S | TMT-5A TMT-5S | 8 8 |
| Schlumberger | Bottom Con. Socket | SL3A SL3S | SL3DA SL4DS | - - | - 8 |

ga - Watthour and Watthour-Demand Meters
Polyphase 2 element - 4 wire Delta - 120/240 volts

(Classes 100 or 200)

Self-Contained Types

| Manufacturer | Type of Base | Watthour Meter Type | Mechanical Demand Watthour Type | Thermal Demand Watthour Type | Number of Terminals |
|------------------|-----------------------|------------------------|---------------------------------------|---------------------------------|------------------------|
| 1 | 2 | 3 | 4 | 5 | 6 |
| Elster | Bottom Con. Socket | ABA-7 | - | - | 7 or 8 |
| | | ABS-7 | - | - | - |
| General Electric | Bottom Con. Socket | V66A | VM66A | - | 7 |
| | | V66S | VM66S | - | - |
| Landis & Gyr | Bottom Con. Socket | - | - | - | - |
| | | MT-15S | BMT-15S | TMT-15S | 7 |
| Schlumberger | Bottom Con. Socket | SL6A | SL6DA | - | - |
| | | SL6S | SL6DS | - | 7 or 8 |

ga - Watthour and Watthour-Demand Meters
Polyphase - 2-1/2 element - 4 wire wye - (120/208) (277/480) volt

(Classes 100, 200, 10, and 20)

Self-Contained Types

| Manufacturer 1 | Type of Base 2 | Watthour Meter Type 3 | Mechanical Demand Watthour Type 4 | Thermal Demand Watthour Type 5 | Number of Terminals 6 |
|-------------------|-----------------------|-----------------------------|---|--------------------------------------|-----------------------------|
| Elster | Bottom Con. Socket | ABA-8 ABS-8 | - - | - - | - - |
| General Electric | Bottom Con. Socket | V65A V65S | VM65A VM65S | - - | 7 - |
| Landis & Gyr | Bottom Con. Socket | - MT-14S | - BMT-14S | - TMT-14S | - 7 |
| Schlumberger | Bottom Con. Socket | SL5A SL5S | SL5DA SL5DS | - - | - 7 or 8 |

Transformer
Rated Types

| | | | | | |
|------------------|-----------------------|----------------------|------------------------|------------------------|---------------|
| Elster | Bottom Con. Socket | ABA-8 ABS-8 | - - | - - | - 13 |
| General Electric | Bottom Con. Socket | V65A V65S | VM65A VM65S | - - | 7 or 13 - |
| Landis & Gyr | Bottom Con. Socket | MT-6A MT-7S or 6S | BMT-6A BMT-7S or 6S | TMT-6A TMT-7S or 6S | 10 7 or 13 |
| Schlumberger | Bottom Con. Socket | SL5A SL5S | SL5DA SL5DS | - - | - 13 |

ga - Watthour and watthour-Demand Meters

Polyphase - 3 element - 4 wire wye - (120/208) (277/480) volt

(Classes 100, 200, 10, and 20)

Self-Contained Types

| Manufacturer 1 | Type of Base 2 | Watthour Meter Type 3 | Mechanical Demand Watthour Type 4 | Thermal Demand Watthour Type 5 | Number of Terminals 6 |
|-------------------|-----------------------|-----------------------------|---|--------------------------------------|-----------------------------|
| Elster | Bottom Con. Socket | ABA-3 ABS-3 | - - | - - | - 7 or 8 |
| General Electric | Bottom Con. Socket | V64A V64S | VM64A VM64S | - - | - 7 or 8 |
| Landis & Gyr | Bottom Con. Socket | - MT-16S | - BMT-16S | - - | - 7 |
| Sangamo | Bottom Con. Socket | S4A S4S | S4DA S4DS | - - | - 7 or 8 |

Transformer
Rated Types

| | | | | | |
|------------------|-----------------------|-----------------------|-------------------------|--------|----------|
| Elster | Bottom Con. Socket | ABA-3 ABS-3 | - - | - - | - - |
| General Electric | Bottom Con. Socket | V64A V64S | VM64A VM64S | - - | - 13 |
| Landis & Gyr | Bottom Con. Socket | MT-9A MT-9S or 10S | BMT-9A BMT-9S or 10S | - - | 12 13 |
| Sangamo | Bottom Con. Socket | SL4A SL4S | SL4DA SL4DS | - - | - 13 |

ga - Meters, Min/Max Indicating

Ammeters Indicating

| <u>Manufacturer</u> | <u>Type</u> | <u>Description</u> |
|---------------------|-------------------------|-------------------------------------|
| Biddle | 50,000 Series | Thermal, Max Pointer |
| Demico | AD121R | Digital min/max ampere demand meter |
| ED Electric | Max-I-Meter(all models) | Thermal Ammeter |
| Schlumberger | ADS | Thermal Ammeter |

Voltmeter, Min/Max

| <u>Manufacturer</u> | <u>Type</u> | <u>Description</u> |
|----------------------------|-------------|----------------------------------|
| Bitronics | VMAMC1 | Digital Demand min/max voltmeter |
| Demico | AV121R | Digital min/max voltmeter |
| Reid and Rochon Associates | LVM-100 | Digital Demand min/max voltmeter |

ga - Watthour and Watthour-Demand Meters

| Manufacturer | Conditions |
|---|---|
| <u>Landis & Gyr</u> Special base, 3 wire, 1 ø watthour meter, Type MS-K, Class 400 watthour and mechanical demand Type BMS-K watthour and thermal demand Type TMS-2K | 1. To obtain experience. 2. To be used only where Class 400 meters are permitted by local regulatory bodies. |
| Socket base, 3 wire, 1 ø watthour meter, Type MS-E, Class 300 | 1. To obtain experience. 2. To be used only where Class 300 meters are permitted by local regulatory bodies. |

ga - Watthour and Watthour-Demand Meters
Solid State Registers

| Manufacturer | Conditions |
|---|-----------------------|
| <u>Elster</u> Solid State Polyphase Watthour meter, Alpha line, A1, A and S type bases (all forms) Class 20 and 200, 120, 240, 277, and 480 V | To obtain experience. |
| <u>GE</u> kV Vector Meter Form 10A, 36A, 45A, 48A, 3S, 9S, 36S, 45S 56S; Class 20; 120 V to 480V or 57V to 120V Form 13A, 16A; Class 150; 120V to 480 V Form 2S, 12S, 16S; Class 200 or 320; 120V to 480V | To obtain experience. |
| <u>Invensys</u> Socket base, 3 wire, single-phase watthour meter, Type iS01, Class 200 | To obtain experience. |
| Socket base, 3 wire, single-phase watthour meter, Type iSA1 Class 200 with integrated Itron 51ESS ERT | To obtain experience. |
| Socket base, 3 wire, single-phase watthour meter, Type iN01 Class 200 Electronic Network Meter. | To obtain experience. |
| Socket base, 3 wire, single-phase watthour meter, Type iNA1 Class 200 iCon Network Meter with Integrated AMR | To obtain experience. |
| <u>Itron Inc.</u> SENTINEL Forms 9S, 10A, 45A, 45S, 46A, 46S, 48A, 66S Class 20 Form 16A Class 150 Forms 2S, 12S, 16S Classes 200 and 320 | To obtain experience. |
| <u>Landis & Gyr</u> Solid State Watthour Meter Type DDS2, Form 5S, 6S, 8S, 9S, 10S, Class 20. | To obtain experience. |
| <u>Power Measurement</u> ION 8300 Form 9S, 35S, 36S Class 20 | To obtain experience. |
| ION 8400 Form 9S, 35S, 36S, 39S, 76S Class 20 | To obtain experience. |
| ION 8500 Form 9S, 35S, 36S, 39S, 76S Class 20 | To obtain experience. |

ga - Watthour and Watthour-Demand Meters
Solid State Registers

| Manufacturer | Conditions |
|--|-----------------------|
| <u>Schlumberger</u> | |
| CENTRON | To obtain experience. |
| Form 2S, Class 200. | |
| Solid State or Mechanical Register. | |
| FULCRUM SQ400 | To obtain experience. |
| Form 5A, 6A, 9A, 5S, 6S, 9S, 10S, Class 20 | |
| FULCRUM SL300 Series | To obtain experience. |
| Form 5A, 6A, 8A, 9A, 5S, 6S, 8S, 9S, 10S, 12S, 14S, 15S, 16S, Class 20 and 200. | |
| QUANTUM Q200 Series | To obtain experience. |
| Form 5A, 6A, 8A, 9A, 5S, 6S, 8S, 9S, 10S, 26S, Class 20 and 200. | |
| QUANTUM Q300 Series | To obtain experience. |
| Form 6A, 9A, 6S, 9S, 10S, Class 10 and 20. | |
| VECTRON SVX | To obtain experience. |
| Form 5A, 6A, 8A, 10A(9A), 5S, 6S, 9S(8S), 12S, 16S(14S, 15S), 26S, Class 20 and 200. | |
| <u>Siemens</u> | |
| Altimus Solid State Meter | To obtain experience. |
| Form 1S, Class 100 | |
| Form 25S, Class 200 | |
| Form 2S, Class 200TA30 and 200TA50 | |
| Form 2SE, Class 320TA30 and 320TA50 | |
| Form 2K, Class 480/600 | |
| Form 3S, 4S, Class 10 and 20 | |
| S4 Polyphase Solid State Meter | |
| Form 5S/45S, 6S/36S, 9S/8S, Class 20 | |
| Form 12S, 16S, Class 200 | |
| <u>Transdata, Inc.</u> | |
| MARK-V EMS | To obtain experience. |
| Form 5S, 5A, 6S, 6A, 8S, 8A, 9S, 9A | |
| Class20 | |

gb - Meter Sockets

| Type or Catalog Number | | | | |
|------------------------|-------------------------|------------------------------|-------------------|----------------------------|
| <u>Manufacturer</u> | <u>Ring</u> | <u>Ringless</u> | <u>No. Jaws</u> | <u>Rating Amps.</u> |
| ABB | #S | | 4, 5, 6 | 100 |
| | STS | | 5, 6 | 200/400** 1ø 3w |
| | STS-2 | | 8 | 200/400** 3ø 3w |
| | STS-3 | | 13 | 200/400** 3ø 4w Y or Delta |
| | STS-7 | | 8 | 200/400** 3ø 4w Delta |
| | STS-8 | | 8 or 13 | 200/400** 3ø 4w Y |
| | | STA-2 | | 200/400 3ø 3w |
| | | STA-3 | | 200/400 3ø 4W Y or Delta |
| | | STA-7 | | 200/400 3ø 4w Delta |
| | | STA | | 200/400 1ø 3w |
| # Anchor | 1000 Series (1003-1006) | 1000 Series (1003-1006) | 4, 5 | 100 |
| | 1100 Series (1100-1109) | 1100 Series (1100-1109) | 4, 5, 7 | 150 |
| | 1200 Series (1201-1209) | 1200 Series (1201-1209) | 4, 5 | 200 |
| | | 1200/1300 Series (1275-1300) | 4, 5, 7 | 200 |
| | 1600 Series (1600-1661) | 1600 Series (1600-1661) | 4, 5 | 320 |
| | 1500 Series (1500-1526) | 1500 Series (1500-1526) | 4, 5 | 100/125 per sta. |
| | 1500 Series (1530-1536) | 1500 Series (1530-1536) | 4, 5 | 150 per sta. |
| | 1500 Series (1540-1546) | 1500 Series (1540-1546) | 4, 5 | 200 per sta. |
| | 1400 Series (1405-1473) | 1400 Series (1405-1473) | 4, 5, 6, 7, 8, 13 | 20/100 |
| | | | | |
| Murray | SJ Series* (Single) | RJ Series* (Single) | 4, 5, 6 | 100 |
| | SN Series* (Single) | RN Series* (Single) | 4, 5, 6 | 100 |
| | SS Series* (Single) | RS Series* (Single) | 4, 5, 6 | 200 |
| | | RH Series* (Single) | 5, 7 | 200 HD |

#Available with UL label

*UL label

gb - Meter Sockets

| Type or Catalog Number | | | | |
|------------------------|--------------------|-------------------|-----------------|---------------------|
| <u>Manufacturer</u> | <u>Ring</u> | <u>Ringless</u> | <u>No. Jaws</u> | <u>Rating Amps.</u> |
| Durham | R-RS512 | RS502# | 4 or 5 | 150 |
| | R-RS502 | | RS512# | |
| | | H-4300 Series# | 4, 5, 7 | 320 |
| | | H-5300 Series# | | |
| | | H-7300 Series# | | |
| | RS101-RS111# | RS101-RS111# | 4 or 5 | 100 |
| | 2R1121-6R1131# | 2R1121-6R1131# | | |
| | 2R1421-6R1431# | 2R1421-6R1431# | | |
| | RS202# | RS202# | 4 or 5 | 200 |
| | RS212, RS213# | RS212, RS213# | 4 or 5 | 200 |
| Dyna-Tech | RS220-RS233# | RS220-RS233# | | |
| | 2R2332-6R2392# | 2R2332-6R2392# | | |
| | <u>Overhead</u> | | | |
| | 1100-C - 1107-C | 1000-C - 1007-C | 4 & 5 | 100 |
| | 1300-C - 1307-C | 1200-C - 1207-C | 4 & 5 | 100 |
| | 2100-CH-2107-CH | 2000-CH-2007-CH | 4 & 5 | 200 |
| | 2300-CH-2307-CH | 2200-CH-2207-CH | 4 & 5 | 200 |
| | <u>Underground</u> | | | |
| | | 2590-CHU-2597-CHU | 4 & 5 | 200 |
| | | 2790-CHU-2797-CHU | 4 & 5 | 200 |
| | | 2090-CHU-2097-CHU | 4 & 5 | 200 |
| | | 2290-CHU-2297-CHU | 4 & 5 | 200 |
| General Switch | 42100 Series* | | 4, 5, 6 | 100 |

*UL Label

#Available with UL label

gb - Meter Sockets

| Type or Catalog Number | | | | |
|------------------------|------------------------------|----------------------------|-----------------|---------------------|
| <u>Manufacturer</u> | <u>Ring</u> | <u>Ringless</u> | <u>No. Jaws</u> | <u>Rating Amps.</u> |
| Landis & Gyr | <u>Overhead</u> AS Series | AS Series | 4, 5, 6 | 100-200 |
| | | A2 thru A6 | 4, 5 | 100-200 |
| | | Series (Multiple Mounting) | | |
| | | CQ# | 4, 5, 7 | 200 |
| | | HQ# | 4, 5, 7 | 200 HD |
| | <u>Underground</u> | HQ-T | 6, 7, 8, 13 | 20 |
| | | RSU# | 4, 5, 6 | 200 |
| | | CQ-U# | 4, 5, 7 | 200 |
| | | HQ-U# | 4, 5, 7 | 200 |
| | | | | |
| Milbank | <u>Overhead</u> | S7462, 3,4,5,6 | | |
| | | U7362*, 3,4,5,6 | 4 or 5 | 100 |
| | | S7486 Series | 4 or 5 | 100 |
| | | S7262 Series | 4 or 5 | 150 |
| | | S7021 Series | 4 or 5 | 200 |
| | | S9550 Series | 4 or 5 | 200 (HD) |
| | | S9700 Series | 7 | 200 (HD) |
| | | | | |
| | <u>Underground</u> | S8086-XL | 4 or 5 | 100 |
| | | S8084-XL | 4 or 5 | 150 |
| | | S7040-XL | 4 or 5 | 200 |
| | | S9551-XL | 4 or 5 | 200 (HD) |
| | | S9701-XL | 7 | 200 (HD) |
| | | | | |
| | | | | |

Available with UL label

*UL label

gb - Meter Sockets

| <u>Manufacturer</u> | <u>Type or Catalog Number</u> | | <u>No. Jaws</u> | <u>Rating Amps.</u> |
|---------------------|-------------------------------|-----------------|-----------------|----------------------------------|
| | <u>Ring</u> | <u>Ringless</u> | | |
| Superior | <u>Overhead</u> | | | |
| | | 501 | 4, 5 | 100 |
| | 314* | 414* | 4, 5 | 150 |
| | 314* | 414* | 4, 5 | 200 |
| | | 452 Series | 4, 5 | 150 per sta. |
| | 382 Series | 482 Series* | 4, 5 | 200 per sta. |
| | | 492 Series | 7 | 200 3ø 4w Y or Delta per sta. |
| | | RLK Series* | 5, 7 | 200 3ø 4W Y or Delta 600 V |
| | <u>Underground</u> | | | |
| | 314* | 414* | 4, 5 | 100 |
| Superior | | 414* | 4, 5 | 150 |
| | | 414 | 7 | 200 3ø 4w Y or Delta |
| | | "RLPK" Series | 5, 7 | 200 3ø 4w Y or Delta 600 V |
| | | BRL 1915 | 4, 5 | 150 per sta. |
| | | | | |

#Available with UL label

* UL label

** Transformer rating in first figure; maximum loading shown by second figure

gb - Meter sockets

| Manufacturer | Conditions |
|--|---|
| <u>Durham</u> M-400 ampere 4 or 5 jaws for use with Class 10 meters | To obtain experience. |
| <u>Landis & Gyr</u> Meter mounting device 400 ampere, Type K-4# for use with Type MS-K, 1 ø Duncan meters | 1. To obtain experience. 2. To be used only where Class 400 meters are permitted by local regulatory bodies. |
| Socket type HQ-4S 4 jaws rated for Class 300 service | 1. To obtain experience. 2. To be used only where Class 300 meters are permitted by regulatory bodies. |
| <u>Milbank</u> Type S1079-F, 4 jaws rated for Class 320 service | To obtain experience. |

#Available with UL label.

gj - Crossarm Assemblies and Arm Spacers

Distribution

Wood crossarm assembly complete with braces and attaching hardware, fittings and bolts

Crossarm Assembly

| <u>Manufacturer</u> | <u>Crossarm Size</u> | <u>Catalog No.</u> |
|---------------------|--------------------------|--------------------|
| Brooks | 3-1/2" x 4-1/2" x 8'-0" | 3103-A8 |
| | 3-3/4" x 5-3/4" x 8'-0" | 3103-C8 |
| | 3-3/4" x 7-3/4" x 8'-0" | 3203-A8 |
| | 3-3/4" x 7-3/4" x 10'-0" | 3203-A10 |
| Hughes Brothers | 3-1/2" x 4-1/2" x 8'-0" | 2890A |
| | 3-3/4" x 5-3/4" x 8'-0" | 2890B |
| | 3-3/4" x 7-3/4" x 8'-0" | 2892-A |
| | 3-3/4" x 7-3/4" x 10'-0" | 2892-B |
| Pennington | 3-1/2" x 4-1/2" x 8'-0" | C500B |
| | 3-3/4" x 5-3/4" x 8'-0" | C500F |
| | 3-3/4" x 7-3/4" x 8'-0" | C500M |

Twin Arm Spacer*

To be used with standard hardware, 3-5/8" x 4-5/8" x 8'-0" crossarm, and 28" wood braces

Line Hardware CAS-455

*Restricted to applications where the conductor's maximum design tension is less than 1250 lbs. and to conductor sizes 1/0 ACSR and below.

gj - Crossarm Assemblies

Braceless, wood

| Manufacturer | Conditions |
|--------------|------------|
|--------------|------------|

Aluma-Form

| | |
|---------------------|-----------------------|
| HD-DEA-86-EB-REA | To obtain experience. |
| HD-2-DEA-86-EB-REA | |
| HD-DEA-108-EB-REA | |
| HD-2-DEA-108-EB-REA | |

Hughes Brothers

| | |
|-----------|-----------------------|
| 3377-A7.5 | To obtain experience. |
| 3377-A8.5 | |
| 3377-A9.5 | |

Braceless, fiberglass

Creative Utility Products

| | |
|----------------------------|----------------------|
| CUP08RUS-SDE-0/2-A/S-S/D-3 | To obtain experience |
| CUP10RUS-SDE-0/2-A/S-S/D-3 | |

Geotek (PUI)

| | |
|------------|-----------------------|
| DA2500-96 | To obtain experience. |
| DA2500-120 | |
| DA3000-96 | |
| DA3000-120 | |

MacLean Power Systems

| | |
|--------|-----------------------|
| PZ08LD | To obtain experience. |
| PZ10LD | |
| PY08SD | |
| PY10SD | |

Powertrusion

| | |
|--------------|-----------------------|
| PSD082A1FRUS | To obtain experience. |
| PSD102A1FRUS | |
| PHD082A1FRUS | |
| PHD102A1FRUS | |

Shakespeare

| | |
|----------------------|-----------------------|
| IDB096N1224(X)RUS** | To obtain experience. |
| XDB096N1224(X)RUS** | |
| HDB096N1224(X)RUS** | |
| IDB120N1224(X)RUS** | |
| XDB120N1224(X)RUS** | |
| (**X=2-Gray Color | |
| 5-Dark Bronze Color) | |

gw - Crossarm Assembly for H-Frame Construction

Applicable Specification: RUS Specification T-7, Revision dated November 1962
 Applicable Drawing: TH-11B Series (161 kV maximum)
 No braces (TH-11B)
 Two vee braces on outside (TH-11BVO)
 Two vee braces on inside (TH-11BVI)
 Four vee braces (TH-11BV4)

3-5/8" x 9-3/8" x 33' wood crossarm assembly complete with
 attaching hardware, fittings, bolts and 3-3/8" x 5-3/8" braces.

| (Assemblies) | <u>Catalog Nos. or Drawing Nos.</u> | | | |
|------------------------|-------------------------------------|---------------------------|---------------------------|---------------------------|
| | <u>TH-11B</u> | <u>TH-11BVO</u> | <u>TH-11BVI</u> | <u>TH-11BV4</u> |
| | <u>Items</u> gw | <u>Items</u> gw and vo | <u>Items</u> gw and vi | <u>Items</u> gw and vv |
| Brooks (1, 2) | 6411 | 6411-1 | 6411-2 | 6411-3 |
| Hughes Brothers (1, 2) | C3316-B | C3316-B | C3316-B | C3316-B |
| Pennington (1, 2) | CCC11B72 | CCC11B72-VO | CCC11B72-VI | CCC11B72-V4 |

- 1 - Fixed spacer fitting sizes as required
 2 - Adjustable spacers are available

gw-2
July 2004

gw - Crossarm Assembly for H-Frame construction
(Double Arm) 230 kV (Small Angle)

Applicable Specification: RUS Specification T-8, Drawing: TH-231B

Assembly complete with attaching hardware, fittings, bolts and braces.

Crossarm 3-5/8" x 9-3/8"

| <u>Manufacturer</u> | <u>Catalog Number</u> |
|------------------------|-----------------------|
| Brooks (1, 2) | 64231 |
| Hughes Brothers (1, 2) | C-3338-B |
| Pennington (1, 2) | CCC231B82 |

Crossarm 5-1/8" x 7-1/2"

| | |
|------------------------|-----------|
| Brooks (1, 2) | 64231L |
| Hughes Brothers (1, 2) | C-3338-BL |
| Pennington (1, 2) | CCC231BT |

- 1 - Fixed spacer fitting sizes as required.
2 - Adjustable spacers are available.

gy - Crossarm Assembly for H-Frame Construction
(Double Arm)

Applicable Specification: RUS Specification T-7, Revision dated November 29, 1962

Applicable Drawing: TH-10 Series

No braces (TH-10)
Two vee braces on outside (TH-10VO)
Two vee braces on inside (TH-10VI)
Four vee braces (TH-10V4)

3-5/8" x 9-3/8" x 32' wood crossarm assembly complete with
attaching hardware, fittings, bolts and 3-3/8" x 5-3/8" braces.

Catalog Nos. or Drawing Nos.

| | TH-10 | TH-10VO | TH-10VI | TH-10V4 |
|------------------------|--------------|--------------|--------------|--------------|
| | <u>Items</u> | <u>Items</u> | <u>Items</u> | <u>Items</u> |
| (Assemblies) | gy | gy and vo | gy and vi | gy and vv |
| Brooks (1, 2) | 6410 | 6410-1 | 6410-2 | 6410-3 |
| Hughes Brothers (1, 2) | C-3316-A | C3316-A | C-3316-A | C-3316-A |
| Pennington (1, 2) | CCC1071 | CCC1071-VO | CCC1071-VI | CCC1071-V4 |
| Nidermeyer-Martin (1) | N-6710 | N-6711 | N-6712 | N-6713 |

1 - Fixed spacer fitting sizes as required

2 - Adjustable spacers are available

gy-2
July 2004

gy - Crossarm Assembly for H-Frame Construction
(Double Arm) 230 kV (Tangent)

Applicable Specification: RUS Specification T-8

Applicable Drawing: TH-230

Assembly complete with attaching hardware, fittings, bolts and braces.

Crossarm 3-5/8" x 9-3/8"

| <u>Manufacturer</u> | <u>Catalog No.</u> |
|------------------------|--------------------|
| Brooks (1, 2) | 64230 |
| Hughes Brothers (1, 2) | C-3338-A |
| Pennington (1, 2) | CCC23081 |
| Niedermeyer-Martin (1) | N-6720 |

Crossarm 5-1/8" x 7-1/2"

| | |
|------------------------|-----------|
| Brooks (1, 2) | 64230L |
| Hughes Brothers (1, 2) | C-3338-AL |
| Pennington (1, 2) | CCC230T |

1 - Fixed spacer fitting sizes as required.

2 - Adjustable spacers are available.

gz - Crossarm Assembly for Wishbone Construction "Z" Type
(Single Arm)

Applicable Specification: RUS Specification T-5

Applicable Drawings: RUS Drawing TSZ-1

3-5/8' x 5-5/8" wood crossarm assembly complete with brace and attaching hardware, fittings, and bolts

The following manufacturers have shown compliance with the applicable specifications for this assembly:

| <u>Manufacturer</u> | <u>Catalog Nos. or Drawing Nos.</u> |
|---------------------|-------------------------------------|
| Brooks | 64Z1 |
| Hughes Brothers | C-3162-A and C-3162.10 |

gz-2
July 2004

gz - Crossarm Assembly for Wishbone Construction, "Z" Type
(Double Arm)

Applicable Specification: RUS Specification T-5

Applicable Drawings: RUS Drawings TSZ-2,

3-5/8" x 5-5/8" wood crossarm assembly complete with brace and attaching hardware, fittings and bolts

The following manufacturers have shown compliance with the applicable specifications for this assembly:

| <u>Manufacturer</u> | <u>Catalog Nos. or Drawing Nos.</u> |
|---------------------|-------------------------------------|
| Brooks (2) | 64Z2 |
| Hughes Brothers | C-3162-B and C-3162.10 |

(2) Adjustable spacers are available.

rp - Wildlife Guards

Bushings and Live Parts Covers

| <u>Manufacturer</u> | <u>Conditions</u> |
|--|-----------------------|
| <u>Chris Kaye (Crittter Guard)</u> 201 - "L" Bracket 202 – Roller 203 - Wheel | To obtain experience. |
| <u>Hendrix Wire & Cable</u> Catalog No. BG-9 | To obtain experience. |
| <u>Hendrix (Eco Electrical Systems, Inc.)</u> EICG-1 EICG-1-WLPT EICG-1-20 EICG-1-32 | To obtain experience. |
| <u>Kaddas Enterprises Inc.</u> KE1045A* birdguard KE1066* arrester cap KE1077* transformer bushing cover KE1053* arrester cap KE1064* transformer bushing cover KE 1049* birdguard | To obtain experience. |
| <u>Tripp (Eco Electrical Systems, Inc.)</u> ECC-1 ECC-2-27-150BIL-S&C-Version 10 ECC-3-27-150BIL-S&C-Version 9 ECC-4-27-125BIL-S&C-Kearney HX ECC-5-ABB-LBU | To obtain experience. |

NOTE: The material composition of these items does not contain a flame-retardant unless specified by the manufacturer.

*Specified by manufacturer as being flame-retardant

Anti-Perch Devices

| <u>Manufacturer</u> | <u>Conditions</u> |
|---|----------------------|
| <u>Hendrix Wire & Cable</u> Catalog No. HPP-24 | To obtain experience |

NOTE: The material composition of these items does not contain a flame-retardant unless specified by the manufacturer.

sb - Switch, disconnect (single-pole, hook operated station class)

NEMA standard switches for station or line structure use where single-pole switching is permissible

| Manufacturer | Type | Voltage Ratings | System Voltages Line to Line |
|------------------------------|-----------------------|------------------------------------|--|
| ABB | HPL | 15 thru 69 kV | 12.5 thru 69 kV |
| Bridges | EH EHL(L) | 15 thru 69 kV 15 thru 34.5 kV | 12.5 thru 69 kV 12.5 thru 34.5 kV |
| Cleaveland/Price | LCO-C | 15 thru 69 kV | 12.5 thru 69 kV |
| Cooper Power Systems | D2(PL) | 15 and 23 kV | 12.5 thru 24.9 kV |
| G & W Electric | B-2M EV(PL) | 15 thru 69 kV 15 thru 34.5 kV | 12.5 thru 69 kV 12.5 thru 34.5 kV |
| Hubbell (Chance) | M3(PL) | 15 thru 27 kV | 12.5 thru 24.9 kV |
| Johnson | HPT | 15 thru 69 kV | 12.5 thru 69 kV |
| Joslyn (Hi-Voltage) | HU HI | 15 thru 34.5 kV 15 thru 34.5 kV | 12.5 thru 34.5 kV 12.5 thru 34.5 kV |
| Kearney/Cooper Power Systems | M-72(PL) H-72 | 15 thru 69 kV 15 thru 34.5 kV | 12.5 thru 69 kV 12.5 thru 34.5 kV |
| MEMCO | STV STU | 15 thru 69 kV 15 thru 69 kV | 12.5 thru 69 kV 12.5 thru 69 kV |
| Morgan | DHS(PL) | 15 thru 69 kV | 12.5 thru 69 kV |
| Royal Switchgear | BT BLT(PL) | 15 thru 69 kV 15 and 23 kV | 12.5 thru 69 kV 12.5 thru 24.9 kV |
| S & C* | LBD(PL) Alduti (L) | 15 thru 34.5 kV 15 and 25 kV | 12.5 thru 34.5 kV 12.5 thru 24.9 kV |

(L) Means solid material load interrupters are available and accepted.

(LV) Means vacuum interrupters are available and accepted.

(PL) Means hooks for portable load interrupters are available for voltages 34.5 kV and below. Consult switch manufacturer concerning loop switching applications at higher voltages.

*Available with porcelain insulators. Available with "Cypoxy" cycloaliphatic epoxy insulators through 34.5 kV on request.

sb - Switch, disconnect (single-pole, hook-operated station class)

NEMA standard switches for station or line
structure use where single-pole switching is permissible

| Manufacturer | Type | Voltage Ratings | System Voltages Line-to-Line |
|-----------------|--------|-----------------|---------------------------------|
| Seeco | BT | 34.5 thru 69 kV | 34.5 thru 69 kV |
| Siemens-Allis | HA | 15 thru 69 kV | 12.5 thru 69 kV |
| | HS(PL) | 15 and 25 kV | 12.5 thru 24.9 kV |
| Southern States | PBO | 15 thru 69 kV | 12.5 thru 69 kV |
| | *PBN | 15 thru 23 kV | 12.5, 13.2, 24.9 kV |
| USCO | HH(PL) | 15 thru 69 kV | 12.5 thru 69 kV |

(L) Means solid material load interrupters are available and accepted.

(LV) Means vacuum interrupters are available and accepted.

* With steel base only.

(PL) Means hooks for portable load interrupters are available for voltages 34.5 kV and below. Consult switch manufacturer concerning loop switching applications at higher voltages.

sb - Switch, disconnect (single-pole, hook operated distribution class)*

For distribution line use where power class insulation is not required and single-phase switching is permissible.

(Not suitable for substation use)

| Manufacturer | Type | Voltage Rating | System Voltage Line-to-Line |
|---------------------------------|-----------|----------------|--------------------------------|
| Cooper Power Systems | D2(PL) | 15 and 25 kV | 12.5, 13.2, 24.9 kV |
| G & W Electric Company | EV(PL) | 15 kV | 12.5 kV |
| Hubbell (Chance) | M3(PL) | 15 and 27 kV | 12.5 thru 24.9 kV |
| Kearney/Cooper Power Systems | D-73(PL) | 15 and 25 kV | 12.5, 13.2, 24.9 kV |
| Morgan | DHS(PL) | 15 and 23 kV | 12.5, 13.2, 24.9 kV |
| Royal Switchgear | BLT-F(PL) | 15 and 23 kV | 12.5, 13.2, 24.9 kV |
| S & C** | LBD(PL) | 15 and 25 kV | 12.5, 13.2, 24.9 kV |
| Siemens-Allis | HD(PL) | 15 and 25 kV | 12.5 thru 24.9 kV |

NOTE: Switches on this page must be furnished with four bolts for double crossarm mounting.

(L) Means solid material load interrupters are available and accepted.

(PL) Means hooks for portable load interrupters are available.

(LV) Means vacuum interrupters are available and accepted.

*Steel bases only.

**Available with porcelain insulators. Available with "Cypoxy" cycloaliphatic epoxy insulators through 34.5 kV on request.

sb - Switch, hookstick
(line tension switches)

for use on 12.5/7.2 kV systems only

| Manufacturer | Conditions |
|---|-----------------------|
| <u>AMP</u> AMPACT | To obtain experience. |
| <u>Bridges</u> 127 | To obtain experience. |
| <u>Hubbell (Chance)</u> ALTD06200R | To obtain experience. |
| <u>Royal Switchgear</u> IL6B-H (available with silicone polymer insulators as catalog number IL6NP) | To obtain experience. |

NOTE: All switches listed on this page have hooks for portable load interrupters.

sc - Regulators, Voltage
12.5/7.2 kV
13.2/7.62 kV

Applicable Specification: "RUS Specification for Substation Regulators," S-2

| Type | Size | Description |
|-----------------------------|-----------------|--|
| <u>ABB</u> | | |
| UTS, UTT | 167-1000 kVA | (S) Three phase step type |
| <u>Cooper Power Systems</u> | | |
| VR-32 | 19.1 - 833 kVA | (SL) Single phase - step type |
| AB | 50 amp. | (L) Single-phase - step type (Auto-Booster) |
| <u>General Electric</u> | | |
| VR-1 | 38.1 - 509 kVA | (SL) Single-phase - step type |
| MLT | 500 - 1000 kVA | (S) Three-phase - step type |
| VML-32 | 500 - 833 kVA | (S) Single-phase - Vacuum step type |
| VMLT-32 | 1200 - 2800 kVA | (S) Three-phase - vacuum step type |
| <u>Siemens-Allis</u> | | |
| JFR | 38.1 - 667 kVA | (SL) Single-phase - step type |

(L) Indicates line use

(S) Indicates substation use

sc - Regulators, Voltage
24.9/14.4 kV

| Type | Size | Description |
|-----------------------------|------------------------|---|
| <u>Cooper Power Systems</u> | | |
| VR-32 AB. | 72 - 833 kVA 50 amp | (SL) Single phase - step type (L) Single phase - step type (Auto-Booster) |
| <u>General Electric</u> | | |
| VR-1 | 72 - 576 kVA | (SL) Single phase - step type |
| VML-32 | 500 - 833 kVA | (S) Single phase - vacuum step type |
| VMLT-32 | 1200 - 4666 kVA | (S) Three phase - vacuum step type |
| <u>Siemens-Allis</u> | | |
| JFR | 72 - 833 | (SL) Single phase - step type |

(L) Indicates line use

(S) Indicates substation use

sc - Regulators, Voltage

| Manufacturer | Conditions |
|---|-----------------------|
| <u>General Electric</u> Three-phase, step-type substation regulator Type TMLT-32 (13.2/7.62 kV) | To obtain experience. |
| <u>Howard Industries, Inc.</u> Single-phase, 32 step, line/substation, 50, 75, 100, 150, and 219 ampere, 7.62 kV, Type SVR-1 | To obtain experience. |
| <u>Siemens-Allis</u> Three-phase, step-type substation regulator Type SFR (13.2/7.62 kV) | To obtain experience. |

sd - Current Transformers
Outdoor Type

| Manufacturer | .6 kV | 15 kV | 25 kV | 34.5 kV | 69 kV |
|--|----------------------------------|----------------------------|---------------------------------|---------------------------------|-----------------------------|
| ABB | CSF/CMS CMF CLC/CLE | KOR-11 KON-11 KOT-11 | ICT-150 KOR-I5 KOT-I5 | ICT-200 KOR-20 - | ICT-350 - - |
| Andover | DCBW DCCW DCAB | - - - | - - - | - - - | - - - |
| G.E.C. Durham Industries (Astra) | AA&TA AB AD&AC | - - - | - - - | - - - | - - - |
| Electromagnetic Industries (Square D) | | CO3-110 | CO3-150 | CO3-200 | IK-350 |
| General Electric | JCR-0 JCW-0 JAK-0 JAD-0 | JKW-5 JCK-5 - - | JKW-6 JKW-150 KG-150 - | JKW-7 JKW-200 KG-200 - | JKW-350 KG-350 - - |
| Kuhlman Electric | | BB-15-971 BB-15-972 | BB-25-973 BB-25-974 | BB-34-975 BB-34-976 | COF-350 - |
| Schlumberger | R6S R6SA R6M R6L | - - - - | - - - - | - - - - | - - - - |

NOTE: The transformer types listed above are accepted in all standard ratios. Insulation class, voltages, ratios and other necessary information should be specified when ordering.

sd - Current Transformers
Outdoor Types

| Manufacturer | Conditions |
|--|-----------------------|
| <u>Electromagnetic Ind. (Square D)</u> Type UMCT, 0.6 kV Type UCT, 0.6 kV Type IK 4-350-69, 69 kV (cycloaliphatic resin bushings) | To obtain experience. |
| <u>Ritz Instrument Transformers, Inc.</u> GIFU 15-01; 0.3 B0.1-1.8, 15kV GIFU 15-01; 0.3 B0.1-0.5, 15kV GIFU 25-01; 0.3 B0.1-0.9, 25kV GIFU 25-01; 0.3 B0.1-2.0, 25kV GIFS 36-55; 0.3 B0.1-0.9, 34.5kV GIF 36-69; 0.3 B0.1-2.0, 34.5kV GIF 72.5-68; 0.3 B0.1-2.0, 69 kV | To obtain experience. |

se - Voltage Transformers

| <u>Outdoor Types</u> | | | | | |
|--|-------|-------------|---------|---------|-----------|
| Manufacturer | .6 kV | 15 kV | 25 kV | 34.5 kV | 69 kV |
| ABB | PPM | VOG-II | LPT-I50 | LPT-200 | LPT-350 |
| | - | VOY-II | VOG-I5 | VOG-20 | - |
| | - | VOZ-II | VOZ-I5 | VOZ-20 | - |
| Andover | DVE-6 | - | - | - | - |
| | DVF-6 | - | - | - | - |
| Electromagnetic Industries (Square D) | | PO5-110 | PO5-150 | PO5-200 | U3-350-69 |
| General Electric | JVA-0 | JVW-5 | JVW-6 | JVW-7 | ET-350 |
| | JVP-0 | JVW-110 | - | - | JVT-350 |
| | - | - | JVT-150 | JVT-200 | - |
| Kuhlman Electric | - | PTT-110-977 | - | - | POF-350 |
| Schlumberger | T5R | - | - | - | - |
| | T6R | - | - | - | - |
| | T7R | - | - | - | - |

NOTE: The transformer types listed above are acceptable in all standard ratios. Insulation class, voltages, ratios and other necessary information should be specified when ordering.

se - Voltage Transformers

Outdoor Types

| Manufacturer | Conditions |
|--|-----------------------|
| <u>G.E.C. Durham Industries (Astra)</u> Type DB, 0.6 kV Type DA, 0.6 kV Type DF, 0.6 kV | To obtain experience. |
| <u>Electromagnetic Industries (Square D)</u> Type U-450, 0.6 kV Type U-4-350-69, 69 kV (cycloaliphatic resin bushings) | To obtain experience. |
| <u>Ritz Instrument Transformers, Inc.</u> VZF 15-20; 2 Bushing 0.3WXYZ, 15 kV VZF 15-10; 2 Bushing 0.3WXY, 15 kV VEF 15-10; 1 Bushing 0.3WXY, 15 kV VEF 15-20; 1 Bushing 0.3WXYZ, 15 kV VZF 25-10; 2 Bushing 0.3WXYZ, 25 kV VEF 25-10; 1 Bushing 0.3WXYZ, 25 kV VZF 36-10; 2 Bushing 0.3WXY, 34.5 kV VEF 36-10; 1 Bushing 0.3WXY, 34.5 kV VEF 72-03; 1 Bushing 0.3WXYZ, 69 kV | To obtain experience. |

sj - Switches, oil circuit recloser by-pass

| Manufacturer | 15 kV For use on 12.5/7.2 kV systems | 27 kV For use on 24.9/14.4 kV systems | 27 kV* For use on 34.5/19.9 kV systems | Current Rating Amperes |
|------------------------------|--|---|--|------------------------------|
| Cooper Power Systems | FW77D7 | FW77D9 | FW77D9 | 600 |
| Hubbell (Chance) | M3-R | M3-R | M3-R | 600 |
| Kearney/Cooper Power Systems | D73RB | D73RB | | 600 |

*Not For Use In Substations

sk-1
July 2004

sk - Switch, regulator by-pass - disconnect
For outdoor use

| Manufacturer | 15 kV for use on 12.5/7.2 kV Systems | 27 kV for use on 24.9/14.4 kV Systems | Current Rating Amperes |
|------------------------------|---|--|------------------------------|
| Kearney/Cooper Power Systems | HB-65 | HB-65 | 600 |
| S & C Electric* | XL | XL | 600 |
| Siemens-Allis | HR | HR | 600 |
| Southern States | BR | BR | 400,600 |

NOTE: All switches should be furnished with NEMA standard insulators and with 110 kV BIL rating (15 kV systems) or 150 BIL ratings (25 kV systems) for station use.

*Available with porcelain insulators. Available with "Cypoxy" cycloaliphatic epoxy insulators through 34.5 kV on request.

sk - Switch, regulator by-pass - disconnect
For outdoor use

| Manufacturer | Conditions |
|---|-----------------------|
| <u>Cooper Power Systems</u> Type B, 15 kV, 400 amperes, 110 kV BIL for station use, 95 kV BIL for line use. | To obtain experience. |

NOTE: All switches should be furnished with NEMA standard insulators and with 110 kV BIL rating for station use.

sl - Switch, Combination Power Fuse and Disconnect

(Used with an additional disconnect switch to by-pass
oil circuit reclosers at substations)

| <u>Manufacturer</u> | <u>15 kV for use on 12.5/7.2 kV systems</u> | <u>27 kV for use on 24.9/14.4 kV systems</u> |
|------------------------------|---|--|
| Joslyn (Hi-Voltage) | RFH | - |
| Kearney/Cooper Power Systems | MHX | MHX |
| S & C Electric* | SMD/LBD XS/LBD | SMD/LBD - |
| Southern States | SF | - |

NOTE: All switches and cutouts should be furnished with NEMA standard insulators.

*Available with porcelain insulators. Available with "Cypoxy" cycloaliphatic epoxy insulators through 34.5 kV on request.

sr - Steel for Substation Grounding, Copper-Clad or Galvanized

(See av-2 for copper grounding conductor)

| Manufacturer | Conditions |
|--|--|
| <u>Copperweld Steel</u> 40% conductivity DSA Copperweld Strand in sizes: 1/2" (7 No. 6 AWG) 9/16" (7 No. 5 AWG) 5/8" (7 No. 4 AWG) 13/16" (19 No. 6 AWG) 7/8" (19 No. 5 AWG) | 1. To obtain experience. 2. When used in soil with resistivity of 25 ohm-meters (2500 ohms per centimeter cube) or less cathodic protection must be incorporated into the grounding design. |
| <u>Indiana Steel & Wire</u> Steel Strand, BB Grade, Class C galvanized 5/8" (19 wire) 1/2" (7 wire) 9/16" (7 wire) 7/16" (7 wire) | 1. To obtain experience. 2. When used in soil with resistivity of 25 ohm-meters (2500 ohms per centimeter cube) or less cathodic protection must be incorporated into the grounding design. |

vx-1
July 2004

vx - Cross Brace assembly, 3-3/8" x 5-3/8"
with hardware and fittings (Dwg. TM-110, RUS Specification T-7)

| <u>Manufacturer</u> | <u>Catalog No.</u> |
|---------------------------|--------------------|
| <u>Brooks</u> | |
| Item 1-vx | 6685-1 |
| Item 2-vx | 6685-2 |
| <u>Hughes Brothers</u> | |
| Item 1-vx | 1042-1 |
| Item 2-vx | 1042-2 |
| <u>Niedermeyer-Martin</u> | |
| Item 1-vx | N-6714-1 |
| Item 2-vx | N-6714-2 |
| <u>Pennington</u> | |
| Item 1-vx | CCC-67-1 |
| Item 2-vx | CCC-67-2 |

Cross Brace assembly, 3-5/8" x 7-1/2" Min.
with hardware and fittings (Dwg. TM-110, RUS Specification T-8)

| <u>Manufacturer</u> | <u>Catalog No.</u> |
|---------------------|--------------------|
| Brooks | 6695 |
| Hughes Brothers | 2061A |
| Niedermeyer-Martin | N6721 |
| Pennington | CCC69 |

PART II

Underground Distribution Equipment

U ae - Surge Arresters, Distribution
for Underground System Pole Risers
(Lightning Arresters)

SiC Type

| Manufacturer | Type | Accepted Ratings - kV | Duty | Manufacturer's Classification | Housing |
|---------------------------------|---------|--------------------------|--------|----------------------------------|---------|
| ABB | GLV | 9, 10 | Normal | Distribution | |
| | LVBB | 18 | Normal | Distribution | |
| General Electric | Alugard | 9, 10, 18 | Heavy | Distribution | |
| Kearney/Cooper Power Systems | Unigap | 9, 10, 18 | Heavy | Distribution | |

NOTE: The arresters listed on this page may be used singly or in parallel, but must be applied in accordance with paragraph VI.A., in RUS Bulletin 61-3, "Underground Rural Distribution." Other arresters listed on pages ae-1 and ae-2 may be used for underground systems when applied in accordance with this bulletin.

U ae - Arresters, Surge

(Shielded for Underground System Pad-Mounted Equipment)

CONDITION OF ACCEPTANCE: To Obtain Experience

ELBOW ARRESTERS

| Manufacturer | Type | Ratings, kV | Type | Interface |
|----------------------|------------|-------------|------|-----------|
| Cooper Power Systems | M.O.V.E. | 9/10 | MOV | 15 kV |
| | M.O.V.E. | 18 | MOV | 25 kV |
| | VariGAP | 9/10 | (1) | 15 kV |
| | VariGAP | 18 | (1) | 25 kV |
| Elastimold ESNA | 167 ESA-10 | 10 | MOV | 15 kV |
| | 273 ESA-18 | 18 | MOV | 25 kV |
| Hubbell | PDE | 9,10 | MOV | 15kV |
| | PDE | 18 | MOV | 25kV |
| Joslyn | ZE | 10 | MOV | 15 kV |
| | | 18 | MOV | 25 kV |

PARKING STAND ARRESTERS

| Manufacturer | Type | Ratings, kV | Type | Interface |
|----------------------|------------|-------------|------|-----------|
| Cooper Power Systems | | 9/10 | MOV | 15 kV |
| | | 18 | MOV | 25 kV |
| | VariGAP | 9/10 | (1) | 15 kV |
| | VariGAP | 18 | (1) | 25 kV |
| Elastimold ESNA | 167 PSA-10 | 10 | MOV | 15 kV |
| | 273 PSA-18 | 18 | MOV | 25 kV |

BUSHING ARRESTERS

| Manufacturer | Type | Ratings, kV | Type | Interface |
|-----------------|------------|-------------|------|-----------|
| Elastimold ESNA | 167 BSA-10 | 10 | MOV | 15 kV |
| | 273 BSA-18 | 18 | MOV | 25 kV |

(1) MOV Type (Internally Gapped)

U ae - Arresters, Surge
(For Underground System Pole Risers)

CONDITION OF ACCEPTANCE: To Obtain Experience

| Manufacturer | Type | MOV Type | | Manufacturer' Classification | Housing |
|---------------------------------|-----------------------|--------------------------|--------|---------------------------------|-----------|
| | | Accepted Ratings - kV | Duty | | |
| ABB | HMX | 9,10,18 | Heavy | Intermediate * | Polymer |
| | RMX | 9,10,18 | | | |
| | XPR | 9,10,18,27 | Heavy | | |
| Cooper | CPS AZR VariSTAR | 9,10,18,27 | Heavy | Distribution | Porcelain |
| | URS UltraSIL VariSTAR | 9,10,18,27 | Heavy | Distribution | Polymer |
| General Electric | Tranquell ** U.D. II | 9,10,18,27 | Normal | Distribution | Porcelain |
| | Tranquell | 9,10,18,27 | Normal | Intermediate | Porcelain |
| Hubbell (Ohio Brass) | DynaVar-PVR | 9,10,18,27 | Heavy | Riser Pole | Polymer |
| Joslyn | ZRP | 9,10,18,27 | Heavy | Distribution | Polymer |
| Kearney/Cooper Power Systems | Univar SGR | 9,10,18,27 | Normal | Riser Pole | Porcelain |

*Has intermediate class arrester characteristics but does not have intermediate class venting capability.

**A non fragmenting U.D. II Arrester is available for 9 & 10 kV designs at higher cost when specified.

Conditional List

U ae(2.1)

July 2004

U ae - Arresters, Surge
(For Underground System Pole Risers)

CONDITION OF ACCEPTANCE: To Obtain Experience

MOV Type (Internally Gapped)

| Manufacturer | Type | Accepted Ratings - kV | Duty | Manufacturer's Classification | Housing |
|--------------|----------------|--------------------------|-------|----------------------------------|-----------|
| Cooper | AZR500 VariGap | 9,10,18,27 | Heavy | Distribution | Porcelain |
| | URG UltraSIL | 9,10,18,27 | Heavy | Distribution | Polymer |
| | VariGap | | | | |

U an - Transformers, Distribution
Pad-Mounted, Dead-Front

(For underground application)

| Manufacturer | Single-Phase 5 - 167 kVA | Three-Phase 30 - 2500 kVA |
|---------------------------|---|---|
| ABB | "Mini-Pak U-5" | Type MTR (75-1500 kVA) "Plazapad-U5" (2000-2500 kVA) |
| Central Moloney | "REA-LP" | - |
| Cooper Power Systems* | "REA Shrubline" | "REA Terra-Tran" |
| | *Cooper Envirotemp FR3 dielectric fluid is available as an option | |
| ERMCO | "Low-Profile" | - |
| General Electric | - | "Compad IV - REA" |
| H. K. Porter (Delta-Star) | "Low Profile U 5-R" | "Porter U5-R3" |
| Howard | "Hi Pad REA" | "Hi Pad 3 REA" |
| Kuhlman | "Lo-Pak ELR" | "K-PAK-3 REA" |
| Pauwels Tranformers | "Turf-Hugger-R" | "Turf-Hugger-R" |
| United (KAEC) | "Pad-Mount" 15-100 kVA (1) "Pad-Mount" 25 & 50 kVA (2) | - |
| VanTran | "Mini-Pad U5" (1) | "VanTran III-U5" |

NOTES

All acceptances are based on RUS Specification U-5, "Specifications for Pad-Mounted Transformers (Single and Three Phase)."

All single-phase and three-phase transformers above accepted for the following voltages (kV) unless otherwise noted: 12.47/7.2; 13.2/7.6; 24.9/14.4; and 24.9/14.4 x 12.47/7.2 dual voltage

(1) Accepted for 12.47/7.2 kV and 13.2/ 7.62 kV only.

(2) Accepted for 24.9/14.4 kV only.

The enclosures for these transformers have been certified as meeting the requirements of ANSI C57.12.28. A copy of the certification is available from the manufacturer.

Not all kVA sizes in above kVA ranges are available from all listed manufacturers.

Some of the above single-phase and three-phase transformers are available with internal under oil surge arresters. The availability and type of arresters vary with each manufacturer. The following types of under-oil arresters are acceptable: "UMX", "Tranquell" and "AZU."

U an-2
July 2004

U an - Transformers, Distribution
Pad-Mounted, Dead-Front

(For unit residential underground application)
(Single-phase, 7.2 kV and 7.6 kV)

| Manufacturer | 5 - 25 kVA Only |
|---|------------------|
| ABB | "Micro-Pak U-5" |
| Central Moloney | "REA-Mini-LP" |
| Cooper Power Systems* | "Ranch Runner" |
| *Cooper Envirotemp FR3 dielectric fluid is available as an option | |
| ERMCO | "REA-MicroTrim" |
| Howard | "Spacesaver Pad" |

NOTES

All acceptances are based on RUS Specification U-5, "Specifications for Pad-Mounted Transformers (Single and Three Phase)."

The enclosures for these transformers have been certified as meeting the requirements of ANSI C57.12.28. A copy of the certification is available from the manufacturer.

U an - Transformers, Distribution
Pad-Mounted, Dead-Front

(For underground application)

Conditions for Acceptance: To Obtain Experience

| <u>Manufacturer</u> | <u>Type</u> |
|------------------------------|--|
| <u>ABB</u> | "Mini-Pak U-5" - Single-phase with composite fiberglass enclosure "Mini Three Phase" (MTP) 30 - 225 kVA |
| <u>Cam Tran</u> | "Cam Tran" - Three-phase, 12.47/7.2 and 13.2/7.6 kV; 30-2500 kVA |
| <u>Carte</u> | Three-phase, 24.9/14.4 kV, 30 - 2,500 kVA |
| <u>Cooper Power Systems*</u> | Single-phase, self-protected with "Magnex" interrupter Single-phase, self-protected with "AZU" MOV heavy-duty, under-oil arrester *Cooper Envirotemp FR3 dielectric fluid is available as an option |
| <u>ERMCO</u> | "E-PAD" Three-phase, 12.47/7.2 kV; 30-2,500 kVA "E-PAD" Three-phase, 24.9/14.4 kV; 30-2,500 kVA |
| <u>General Electric</u> | "Compad -IV-REA" - Three-phase, 75-750 kVA All above with amorphous metal cores |
| <u>GE-Prolec</u> | Mini Padmount, Single-phase, 10-167 kVA |
| <u>Square D</u> | Class 7230 REA - Three-phase, 75-2500 kVA 12.47/7.2 kV and 13.2/7.62 kV |
| <u>Van Tran</u> | "Mini-Pad U5" - 5-167 kVA, 24.9/14.4 kV |

NOTES

All acceptances are based on RUS Specification U-5, "Specifications for Pad-Mounted Transformers (Single and Three Phase)."

All single-phase and three-phase transformers above conditionally accepted for the following voltages (kV) unless otherwise noted: 12.47/7.2; 13.2/7.6; 24.9/14.4; and 24.9/14.4 x 12.47/7.2 dual voltage

The enclosures for these transformers have been certified as meeting the requirements of ANSI C57.12.28. A copy of the certification is available from the manufacturer.

Not all kVA sizes are available from all listed manufacturers.

U ax - Cutout and Arrester, Combination
for Underground System Pole Risers

| Nominal System Voltage | For 12.5/7.2 kV | | For 13.2/7.6 kV | For 24.9/14.4 kV |
|-------------------------------|---------------------|--------------------|--------------------|----------------------|
| Cutout Maximum Voltage Rating | 7.8 kV | 15 kV | 15 kV | 27 kV |
| Application | 1ø Risers | 3ø Risers | 1ø and 3ø Risers | 1ø and 3ø Risers |
| Cutout Current Rating | 100 amps | 100 amps | 100 amps | 100 amps |
| Manufacturer | Catalog Numbers | | | |
| ABB | 7.8LBU-II/ 10 LV | 15LBU-II/ 10 LV | 15LBU-II/ 10 LV | 24.9LBU-II/ 18 LV |
| Cooper | AFS300B Series | AFS300C Series | AFS300C Series | AFS300D Series |
| General Electric | 9F80 | 9F80 | 9F80 | 9F80 |
| Hubbell (Chance) | C7 Series | C7 Series | C7 Series | C7 Series |
| Southern States | CA Series | CA Series | CA Series | CA Series |

NOTE: The units listed on this page may be used with single arresters or arresters in parallel, but must be applied in accordance with paragraph VI.A. in RUS Bulletin 61-3, "Underground Rural Distribution." Other arresters listed on pages ae-1 and ae-2 may be used for underground systems when applied in accordance with this bulletin.

Cutouts used on underground riser poles should be loadbreak type or have hooks for portable load interrupters.

Either normal duty or heavy duty distribution class arresters listed on page ae-1 are acceptable for use with these combination units.

U ax - Cutout and Arrester
Combination for Underground System Pole Risers
Metal Oxide Type Arresters

| Nominal System Voltage | For 12.5Y/7.2 kV | | For 13.2Y/7.6 kV | For 24.9Y/14.4 kV | Conditions |
|-------------------------------|---------------------|---------------------|---------------------|-------------------|-----------------------|
| Cutout Maximum Voltage Rating | 7.8 kV | 15 kV | 15 kV | 27 kV | |
| Application | 1ø Risers | 3ø Risers | 1ø and 3ø Risers | 1ø and 3ø Risers | |
| Cutout Current Rating | 100 amps | 100 amps | 100 amps | 100 amps | |
| Manufacturer | Catalog Numbers | | | | |
| Cooper Power Systems | L4A1P1A00-ECO(9kV) | L9C1P1A00-ECO(9kV) | L9C1P1A00-ECO(9kV) | L9D1P1A00-EGO | To obtain experience |
| | L4A1P1A00-EDO(10kV) | L9C1P1A00-EDO(10kV) | L9C1P1A00-EDO(10kV) | - | To obtain experience. |

Note 1: Other arresters listed on pages ae-1 and ae-2 may be used for underground systems when applied in accordance with RUS Bulletin 61-3, "Underground Rural Distribution."

Note 2: Cutouts used on underground riser poles should be loadbreak type or have hooks for portable load interrupters.

U be - Reclosers, pad-mounted

| Manufacturer | Conditions |
|--|-----------------------|
| <u>Cooper Power Systems</u> Single phase, vacuum interrupter, Type PV4H Maximum voltage 14.4 kV for 12.5 and 13.2/7.62 kV | To obtain experience. |

NOTES:

1. Series trip reclosers with ratings greater than 100 amp for 12.5/7.2 kV application, greater than 200 amp for 24.9/14.4 kV application, and 280 amp for 34.5/19.9 kV application are acceptable only with ground trip device. Shunt trip reclosers without ground trip devices may not be used with trip settings higher than 200 amp for 12.5/7.2 kV application, greater than 400 amp for 24.9/14.4 kV application, and 560 amp for 34.5/19.9 kV application.
2. Reclosers are not acceptable with load current, bushing CT battery chargers.

U be - Reclosers, vacuum interruption with solid dielectric

| Manufacturer | Conditions |
|--|-----------------------|
| <u>G & W Electric Company</u> Three phase, electronic, VIPER Series, vacuum interruption, solid dielectric, 800 amps maximum continuous, 12,500 amps RMS symmetrical interruption, 15.5 kV maximum for 12.5/7.2 kV, 27 kV maximum for 24.9/14/4 kV. | To obtain experience. |

NOTES:

1. Series trip reclosers with ratings greater than 100 amp for 12.5/7.2 kV application, greater than 200 amp for 24.9/14.4 kV application, and 280 amp for 34.5/19.9 kV application are acceptable only with ground trip device. Shunt trip reclosers without ground trip devices may not be used with trip settings higher than 200 amp for 12.5/7.2 kV application, greater than 400 amp for 24.9/14.4 kV application, and 560 amp for 34.5/19.9 kV application.
2. Reclosers are not acceptable with load current, bushing CT battery chargers.

U cg - Switch, air, three-pole, group-operated
for pole-mounted cable risers
(Factory Preassembled)

| Manufacturer | Mounting | Vertical Break | | Side Break | |
|---------------------------------|------------|----------------|-------|------------|-------|
| | | Type | kV | Type | kV |
| ABB | Vertical | LB3-VR(L) | 15 | - | |
| Hubbell (Chance) | Vertical | - | | D7(L) | 15-27 |
| | Horizontal | - | | D7(L) | 15-27 |
| Kearney/Cooper Power Systems | Horizontal | SB_R(L) | 15-35 | - | |
| S & C* | Vertical | - | | Alduti(L) | 15-25 |
| | Horizontal | - | | Alduti(L) | 15-25 |

(L) Means gas or solid material full-load interrupters are accepted and available.

*Available with porcelain insulators. Available with "Cypoxy" cycloaliphatic epoxy insulators through 34.5 kV on request.

NOTE: Switches with factory-assembled crossarm type bases must have nonconducting crossarm type bases, nonconducting braces, and insulated interphase and control rods.

U cg - Switch, Air, Three-Pole, Group Operated

| Manufacturer | Conditions |
|--|-----------------------|
| <u>Hubbell (Chance)</u> Type AR side-break, horizontal and vertical mounting, with non-conducting crossarm type base and insulated interphase and control rods, 15, 25 , and 34.5 kV (grounded wye) | To obtain experience. |
| <u>S & C*</u> Omni-Rupter (L), side break horizontal and vertical mounting with non-conducting crossarm type base and insulated interphase and control rods, 15 kV and 25 kV | To obtain experience. |

(L) Means full-load interrupter accepted and available.

*Available with porcelain insulators. Available with Cypoxy insulators through 34.5 kV on request.

U fw - Secondary Tap Connector

| Manufacturer | Type or Catalog No. |
|----------------|---|
| Tyco (Raychem) | Compression Connectors CRSM-CT-34/10-150 CRSM-CT-53/13-200 CRSM-CT-84/20-250 Standard Split Bolt CRSM-CT-53/13-200 |

U fz - Transformer Connector Block, Insulated
Multiple Cable Connectors

Watertight - For use in all locations

| Manufacturer | Connection Type | Catalog Number |
|--------------|-----------------|--|
| Blackburn | Lug | SCU, with lugs and sleeves |
| Burndy | Lug | Stud Mole with sealing sleeve |
| Utilco | Set Screw | PTF-SS, Watertight Insulated transformer Connector block |

Non-Watertight - For use in above grade locations only

| | | |
|-------------------------|-----------|---|
| Alcoa | Lug | Interchange 1 ABBD Series (Disconnectable) Use with A9 insulating boots |
| Alcon | Set Screw | VBTT Series with double sealing sleeve |
| Blackburn | Set Screw | TSB-J58C (Permanent) |
| | Set Screw | TSB-D58C (Disconnectable) |
| Burndy | Set Screw | K-D Series (Disconnectable) K-DF Series (Permanent) |
| Connector Mfg. Co. | Set Screw | Uni-Joint Bar Connectors, (Series RLS, NSM- C, NDS-C, NSC, ZS-C, ZSU-C, RLUS) (Permanent) |
| | Set Screw | Uni-Joint Bar Connectors, (Series RLSS, NSSM-C, NSSC, ZQC, ZQU-C, RLUS) (Disconnectable) |
| ESP | Lug | Types SUR and RDSR(Removable) (With Types LA and AL-lugs and Sleeve kits) |
| | Set Screw | Type UPSO-I (Permanent) Type UPM-I (Disconnectable) |
| Homac | Lug | DF Series |
| | Lug | FTU 125 Series(Disconnectable) with flood seal sleeve kit |
| | Set Screw | LRT Series |
| Hubbell (Fargo) | Bolted | GUC Series |
| | Set Screw | GUS-460S Series |
| MacLean (Reliable) | Set Screw | 15912-REA (Disconnectable) |
| Penn Union | Lug | Type DBAT (Permanent) |
| | Lug | Type DBAT-LH (Disconnectable) Use with Series DBTB, DBTBF and DBTH lug and Sleeves kits |
| Preformed | Set Screw | SC-C series (Permanent) |
| | Set Screw | CSC-Q-C Series, SC-Q-C series (Disconnectable) |
| Utilco | Set Screw | PTF-IN (Permanent) |
| | Set Screw | PTF-CJNU, PSS Series (Disconnectable) |
| Vector Connectors Corp. | Set Screw | TQL Series (Disconnectable) (with insulating boot) |

Note: Additional insulation may be required with some of the above-listed secondary terminal blocks due to the irregularity of mating surfaces between various secondary studs being supplied by the transformer manufacturers.

U gc - Shield, cable riser

| Manufacturer | Dia. (Inches) | Length (Feet) |
|--|---|----------------|
| <u>Galvanized Steel</u> | | |
| Almat Metal Limited | 2 1/4 | 8 |
| Electrical Materials | 2 - 3 - 4 - 5* | 5* |
| Hubbell (Chance) | 2 - 3 - 3 1/2 | 5 - 9 |
| Joslyn | 2 - 3 - 3 1/2* | 5 - 8* |
| Midland-Ross (Kindorf Snapduct) | 2 1/2 - 3 1/2 - 5 (14 ga. galv. steel) | 2 1/2 - 5 - 10 |
| <u>Plastic and Fiberglass</u> | | |
| Applied Extrusion Technologies (plastic) (Power Mold, I, II, III) | 2 - 3 - 4 - 5 - 6* | 5 - 8 - 10* |
| Carlton | 2 - 3 - 4 - 5 - 6* | 10* |
| Custom Plastics | 2 - 3 - 4 - 5* | 5 - 10* |
| Electrical Materials (plastic) | 1 - 2 - 3 - 4 - 5 - 6* | 5 - 8 - 10* |
| Joslyn (plastic) | 2* | 10* |
| Nordic (fiberglass) | 2 - 3 - 5* | 5 - 10* |

(Order by size and length)

*All sizes available with back plate.

Full Round**

| | | |
|--|---------------|----|
| Smith Fiberglass Products (standard wall) | 2 - 3 - 4 - 5 | 30 |
|--|---------------|----|

**Full round riser shield is to be mounted directly to the surface of the pole with no standoffs.

U gk - Terminations, Indoor

(When ordering specify conductor size, type, whether
copper or aluminum and insulation diameter)

| <u>Manufacturer</u> | <u>Catalog No.</u> |
|---------------------|--------------------|
|---------------------|--------------------|

PREMOLDED

| | |
|-----------------------------|---|
| <u>Cooper Power Systems</u> | Fasterm Stress Cone (15 & 25 kV) |
| <u>Elastimold (ESNA)</u> | Style 35-MSD (15, 25 & 35 kV) |
| <u>Hubbell (Chardon)</u> | Termi-Matic, Type A or G (15, 25 & 35 kV) |

HEAT SHRINK

| | |
|-----------------------|--|
| <u>DSG-Canusa</u> | CT Series (15kV, 25kV, 35kV) |
| <u>G&W</u> | ESTS15_PLA (15 kV) ESTS25_PLA (25 kV) |
| <u>Hellermann</u> | MVTS15_PLA (15 kV) MVTS25_PLA (25 kV) |
| <u>Tyco (Raychem)</u> | HVT (15, 25 & 35 kV) |

COLD SHRINK

| | |
|-----------------------|--|
| <u>3M</u> | QT III Series (15 kV) Quick Term II Series (25 & 35 kV) |
| <u>Joslyn</u> | JIPT Series (15, 25 kV) JPT Series (25 kV) |
| <u>Tyco (Raychem)</u> | TFT Series (15, 25, 35 kV) |

INSULATED WRAP

| | |
|------------------------|------------------------------|
| <u>Plymouth/Bishop</u> | Stress-Wrap (15, 25 & 35 kV) |
|------------------------|------------------------------|

U gk - Terminations, outdoor
(with mounting hardware)*

(When ordering, specify conductor size, type, whether
copper or aluminum, insulation diameter, and type of
mounting desired)

| Manufacturer | Catalog Number |
|-----------------------------|--|
| <u>POLYMER</u> | |
| <u>PREMOLEDDED</u> | |
| <u>Cooper Power Systems</u> | Fasterm Series (15 & 25 kV) |
| <u>Elastimold (ESNA)</u> | Style 16-THG (15 and 25 kV) (for bare concentric neutral cable) Style 35-MT (35 kV) (for bare concentric neutral cable) Style PCT-1 (15 kV) (for jacketed cable) Style PCT-2 (25 kV) (for jacketed cable) |
| <u>Hubbell (Chardon)</u> | Termi-Matic, Type G (15, 25 and 35 kV) |
| <u>HEAT SHRINK</u> | |
| <u>DSG-Canusa</u> | CT Series (15kV, 25kV, 35kV) |
| <u>G&W</u> | ESTS15_PLO (15 kV) ESTS25_PLO (25 kV) |
| <u>Hellermann</u> | MVTS15_PLO (15 kV) MVTS25_PLO (25 kV) |
| <u>Plymouth/Bishop</u> | SWO Kit (15, 25 and 35 kV) |
| <u>Tyco (Raychem)</u> | HVT (15, 25 and 35 kV) |
| <u>COLD SHRINK</u> | |
| <u>Joslyn</u> | JPT Series (15, 25, 35 kV) |
| <u>Tyco (Raychem)</u> | TFT Series (15, 25, 35 kV) |
| <u>3M</u> | QT III Series (15, 25, & 35 kV) |
| <u>PORCELAIN</u> | |
| <u>G & W</u> | "Eliminator" 15 kV, E 25 kV, E 35 kV, E |
| <u>Joslyn</u> | "Easy-On II" (15, 25 and 35 kV) |

*Mounting Hardware is used to attach termination to mounting bracket (U hd or U hj).
NOTE: Some of the above terminators may require ordering the mounting hardware separately.

U gn - Enclosures, equipment

Applicable Specifications: "RUS Specifications for Equipment Enclosures," U-4

| <u>Manufacturer</u> | <u>Catalog No.</u> |
|------------------------|--|
| <u>Durham</u> | AT-42 Series (dead-front) AT-54 Series (dead-front) |
| <u>Elliott</u> | EPM-PTS (dead-front) |
| <u>Malton Electric</u> | ME Series (dead-front) MEV Series (dead-front) |
| <u>Maysteel</u> | EL100 (dead-front) |
| <u>Nordic</u> | ND-28 and ND-33 |

NOTE:

1. The above enclosures are available with various multipoint terminations. The owner should specify termination points to be provided.
2. These enclosures have been certified as meeting the requirements of ANSI C57.12.28. A copy of the certification is available from the manufacturer.

U gn - Enclosures, Equipment

Sectionalizing Enclosures

| <u>Manufacturer</u> | <u>Catalog No.</u> |
|-------------------------------|---|
| <u>Cooper Power Systems</u> | SecTER Series I and II (Single-Phase and Three-Phase) |
| <u>Durham</u> | AMSP() Series |
| <u>Fiberglass Fabricators</u> | FSC-32 Single Phase FSC-62 Three Phase |
| <u>Howard Industries</u> | Catalog No. 4548-268770-200, single-phase and 4578-268770-200 three-phase, pad-mounted |
| <u>Malton Electric</u> | ME Series MEH Series |
| <u>Maysteel</u> | CW200 Series CW300 Series |
| <u>Nordic</u> | ND-20, ND-36, ND-40, ND-55, ND-68 |
| <u>Power Design Inc.</u> | Type CJP series, single-phase and three-phase, 15 and 25 kV |
| <u>Rough Rider Industries</u> | Series RUF93 |
| <u>Shallbetter</u> | SPMS Series (dead-front) |

NOTE:

1. The above enclosures are available with various multipoint terminations. The owner should specify termination points to be provided.
2. These enclosures have been certified as meeting the requirements of ANSI C57.12.28. A copy of the certification is available from the manufacturer.

U go-1
July 2004

U go - Fault Indicator
(For Construction Unit UM 6-4)

| Manufacturer | Type |
|----------------------------|---|
| Cooper Power Systems | S.T.A.R. CR, DR, ER, MR, TPR |
| Edison Control Corporation | Series EC100 (single phase) Series EC300 (three phase) (Available with mounting kit KT5002) |
| Fisher Pierce | Series 1514 (current reset, single-phase) Series 1515 (current reset, three-phase) Series 1541 (time reset, single-phase) Series 1543 (time reset, three-phase) Series 1547 (adaptive trip) |
| Horstmann GmbH | FCI-LT Series Time Reset 29-3014 (.85 to 1.57 inch) 29-3015 (1.57 to 2.37 inch) Current Reset 29-3114 (.85 to 1.57 inch) 29-3115 (1.57 to 2.37 inch) |

Note: Fault indicators that require the drilling or cutting to the enclosure for mounting are not acceptable.

U gp - Connector Blocks and Splices, Secondary

Watertight - For Use In All Locations

| Manufacturer | Connection Type | Catalog Number |
|---------------------------------|-------------------|--|
| Alcon | Set Screw | VPB Series |
| Blackburn | Lug | Series UP (with lugs and sleeves) |
| | Set Screw | Series USB (1000 amp bus with sleeves) |
| Burndy | Lug | URD Mole |
| Connector Mfg. Co. | Compression | Utilug Sure Seal Splice Kits, Series SSK, SSKL |
| | Set Screw | Uni-Joint Sure Seal Series SSBC |
| | Set Screw | Secondary Connector ULS2-350 |
| ESP | Lug | Type UC (8 AWG - 500 kcmil) |
| | | (with LA lug and sleeve) |
| | Set Screw | Type UPP |
| Homac | Connector Blocks: | |
| | Lug | FS-95 Series with flood seal sleeve kit (8AWG - 350 kcmil) |
| | Lug | FS-125 Series with flood seal sleeve kit (350 - 500 kcmil) |
| | Set Screw | SHC Series |
| | Set Screw | RAB Series |
| | Splices: | |
| | Compression | RRK Series (#2AWG - 350 kcmil) |
| | Set Screw | UH11L |
| | Set Screw | USK Series |
| | Set Screw | MTB Series |
| Hubbell (Fargo) | Set Screw | GU-600 Series |
| Kearney/Cooper Power Systems | Compression | HCR |
| | Compression | HAR |
| MacLean (Reliable) | Set Screw | 15903-15908, 15910 with sleeve kit (4 AWG - 350 kcmil) |
| | | 15911 with sleeve kit (500 - 750 kcmil) |
| Penn Union | Lug | DBA Series with DBTB, DBTBF and DBTH Series lug and sleeve kits |
| Preformed | Set Screw | HT Kit Series |
| Raychem | Set Screw | GILS-4/0 |
| Utilco | Set Screw | Safety Sub Splice - USPA-350SS |

U gp - Secondary Connector Blocks and Splices, Insulated

Non-Watertight - For Use In Above-Grade Pedestals Only

| <u>Manufacturer</u> | <u>Connection Type</u> | <u>Catalog Number</u> |
|-------------------------|------------------------|-----------------------|
| Blackburn | Set Screw | Type PSB-C |
| Connector Mfg. Co. | Set Screw | Uni-Joint Series NCA |
| ESP | Set Screw | UPC Series |
| Homac | Set Screw | CLR-350 Series |
| | Set Screw | PVAB Series |
| Hubbell (Fargo) | Set Screw | GUS-460 Series |
| Utilco | Set Screw | PED-350-IN Series |
| Vector Connectors Corp. | Set Screw | PC Series |

U gq - Boot or sleeve, insulated*

| Manufacturer | Catalog Number |
|----------------------|---|
| Blackburn | MPC9 MPC15 |
| Electrical Materials | 100-B (For pad-mounted transformer spade terminals) |

*Use restricted to 120/208 volt 500 kVA transformers and larger not equipped with threaded studs.

U gu-1
January 2005

U gu - Pedestal, Power
(Above-Grade)
Refer to Construction Drawing UK5

Applicable Specifications: "RUS Specifications for Secondary Power Pedestals," U-6

| Manufacturer | Inside Dimensions Inches | Height Inches | Catalog No. |
|---|-----------------------------|------------------|--------------------------|
| <u>API</u> | 6X6 | 32 | API 6X6 |
| | 9X10 | 25-1/2 | API 9 X 10 |
| | 10X11 | 34 | API 10 X 11 |
| | 10X11 | 12-1/4 | API 10 X FM |
| | 10X11 | 72 | API 10X11XL |
| | 10X14 | 22-1/2 | API 10 X 14 |
| | 10X14 | 26-1/2 | API 10 X 14 WB |
| | 16X28 | 38 | API 16X28 |
| | 13 Dia. | 25 | API 176 |
| <u>Coil Sales</u> (Charles Industries) | 8.25 Dia | 31-1/2 | CPLP-8 |
| | 8.25 Dia | 31-1/2 | CPLP-8I(Integral Stake) |
| | 10.75 Dia | 31-1/2 | CPLP-10 |
| | 10.75 Dia | 31-1/2 | CPLP-10I(Integral Stake) |
| <u>Electrimold</u> | 14.5 x 19.5 | 31.5 | EFSO-111630 |
| <u>Fiberglas Fabricators</u> | 14 X 9 | 31 | FFSP Series |
| | 15.5 X 15.5 | 30 | FFSP Series |
| | 15.5 X 15.5 | 36 | FFSP Series |
| | 14 X 9 | 42 | FFSP Series |
| | 9 X 9 | 31 | FFSP Series |
| <u>MacLean (Reliable)</u> | 8 x 8 | 38 | UP 8HLP |
| | 8 x 8 | 46 | UP 8HP |
| | 10-1/2 x 10-1/2 | 26 | UP 10HLP |
| | 16-1/2 x 10-1/2 | 36 | UP 1016HLP |
| | 10-1/2 x 10-1/2 | 42 | UP 10HP |
| <u>Nordic</u> | 8 x 8 | 44 | PR-50, PR-55 |
| | 9 x 14 | 30 | PR-149 (stake) |
| | | | PR-150 (stakeless) |
| | 9 x 14 | 30 | PRMC 150 (low profile) |
| | 9 x 14 | 24 | PRMC-160 |
| | 9 x 14 | 30 | PRMC-170 (high profile) |
| | 9 x 14 | 36 | PRMC-190 |
| | 9 X 13 | 30 | PSP-91330 |
| | 10 X 15 | 38 | PSPF-101538 |
| | 15 X 15 | 30 | PSP-151530 |
| | 21 X 21 | 15 | PHH-212115 |
| | 16 X 19 | 12 | PHH-161912 |
| <u>PenCell</u> | 11X14 | 37 | AG-15 |

U gu - Pedestal, Power
(Above-Grade)
Refer to Construction Drawing UK5

Applicable Specifications: "RUS Specifications for Secondary Power Pedestals," U-6

| <u>Manufacturer</u> | <u>Inside Dimensions Inches</u> | <u>Height Inches</u> | <u>Catalog No.</u> |
|---------------------------|-------------------------------------|--------------------------|--------------------|
| <u>Shallbetter</u> | 7.5 x 10.25 | 39 | SUTP Series |
| <u>Utility Fiberglass</u> | 27 x 16 | 40 | PPFP-2700 |
| <u>Vertex</u> | 8 x 14 | 30 | SP 814 |

*Furnished with stake.

**Pole mounted

U gu-2
January 13, 2005

U gu - Power Pedestal
(Below-Grade)
Refer to Drawing UK6

Applicable Specifications: "RUS Specifications for Secondary Power Pedestals," U-6

| <u>Manufacturer</u> | <u>Catalog No.</u> |
|------------------------------|--|
| <u>Armorcast</u> | Polymer concrete frame and cover with fiberglass reinforced polyester skirting 6001 Series. P600XXXXA Rotocast Series, molded polyethylene with penta-head bolt |
| <u>Associated Plastics</u> | Molded polyethylene with galvanized steel or plastic cover Catalog Nos. 1730-1, 3; 1324-1, 3 |
| <u>Blackburn</u> | Molded polyethylene with galvanized steel cover and ground lug. Catalog No. SDR-2PG |
| <u>Burndy</u> | Molded polyethylene with galvanized steel cover. Catalog No. URD20G23 |
| <u>Carson</u> | Molded polyethylene with plastic cover Catalog No. 1324-12B and 1730-12B H910, HLW1212, H1118, H1324, H1730, H1730, H2436, H3048, HH3060 |
| <u>CDR Systems (Homac)</u> | Fiber reinforced polymer concrete - PA Series with penta-head bolts |
| <u>Christy Concrete</u> | Polyester reinforced plastic - Series FL8TRCBOX, FL9TRCBOX, FL30TRCBOX, FL36TRCBOX |
| <u>Dexol</u> | HDPE, DX-101, DX-102 ABS, DX-101HD, DX-102HD |
| <u>Electrimold</u> | Polymer concrete ring and cover with fiberglass reinforced skirting ECAB series. Boxes EPBTH,EPBA series |
| <u>Fiberglas Fabricators</u> | FFHH Series, Fiberglass FFHHPC Series, Fiberglass polymer concrete hybrid |
| <u>Highline</u> | HL50AE |
| <u>Hubbell (Fargo)</u> | HDPE, B-100R Series ABS, B-200R Series HL51 |

U gu - Power Pedestal
(Below-Grade)
Refer to Drawings UK6

Applicable Specifications: "RUS Specifications for Secondary Power Pedestals," U-6

| <u>Manufacturer</u> | <u>Catalog No.</u> |
|-----------------------------------|--|
| <u>Malton</u> | Fiberglass secondary pedestal FSP31139, FSP301515 |
| <u>Pen-Cell</u> | PE Series-High Density Polyethylene (HDPE) base;lid available in HDPE, fiberglass, aluminum, or stainless steel;PEM Series with modular construction Polycarbonate Box cover - Catalog No. AG-20-6-REA |
| <u>Quazite</u> | Power Pedestal – PV, Boxes - PX/PE Series, PR/LR Series, PC, PG, LG Series |
| <u>Synertech Moulded Products</u> | S1212, S1118, S1324, S1730, S2436, S3048 and S3660 |
| <u>Thermodynamics</u> | PP91, PP92, PP94, PP96, and PPV91 Series |

U gv-1
July 2004

U gv - Stake, Power Pedestal
Refer to Construction Drawing UK5

| Manufacturer | Length Inches | <u>Catalog No.</u> | |
|--------------------|---------------|-------------------------|--------------------|
| | | For Power Pedestal Only | For Joint Pedestal |
| Hubbell (Fargo) | 42-60-72-78 | UP-530S Series | UP-530J Series |
| MacLean (Reliable) | 72-78-84 | DM Series | DM Series |

U hb - Cable Accessories

(When ordering specify conductor size, type whether copper or aluminum and insulation diameter)

(Items on this page are rated for operation on three-phase systems and may be used on single-phase systems.)

200 Ampere Continuous Current Rating

| <u>Manufacturer</u> | <u>Catalog No.</u> |
|-----------------------------|---|
| <u>Cooper Power Systems</u> | 15 kV, used with loadbreak connectors LPC 215 protective cap LBI215 bushing well insert 2637869C01M rotatable two-way bushing well insert 2604231B01 bushing well plug 25 kV, used with loadbreak connectors LPC 225 protective cap LB1225 bushing well insert LB1225L (long) bushing well insert 2637881C01M rotatable two-way bushing well insert 2604231B01 bushing well plug 35 kV, used with loadbreak connectors 2637592B03M protective cap |
| <u>Hubbell (Chardon)</u> | 15 kV, used with loadbreak connectors Switch module 9U02AAB001 Basic connector module 9U05 Series Insulating cap 9U01AEW400 Feed-through insert 9U04AEB001 25 kV, used with loadbreak connectors Switch module 9U02BAB001 Insulating cap 9U01BEW500 Feed-through insert 9U04BEB001 |

U hb - Cable Accessories
(When ordering specify conductor size, type, whether
copper or aluminum and insulation diameter)

(Items on this page are rated for operation on three-phase systems and may be used on single-phase systems.)

200 Ampere Continuous Current Rating

| <u>Manufacturer</u> | <u>Catalog Number</u> |
|--------------------------|--|
| <u>Elastimold (ESNA)</u> | 15 kV, used with loadbreak connectors Style 1601-CL cable lead Style 1602A3R feed thru insert Style 1601-A3R bushing plug Style 160-DR insulating cap 25 kV, used with loadbreak connectors Style 2701-A2 bushing plug Style 270-DR deadend receptacle 35 kV, used with loadbreak connectors Style 3701A-3 bushing plug* Style 370DR(G) insulating cap |

U hb - Cable Accessories

(When ordering, specify conductor size, type, whether copper or aluminum and insulation diameter)

600 Ampere Continuous Current Rating

| <u>Manufacturer</u> | <u>Catalog Number</u> |
|-----------------------------|--|
| <u>Hubbell(Chardon)</u> | 15 kV Deadbreak termination connectors 9U60AAL (with test point) 9U60ABL (without test point) 25 kV Deadbreak termination connectors 9U60BAL (with test point) 9U60BBL (without test point) |
| <u>Cooper Power Systems</u> | 15 kV Deadbreak termination connectors Bol-T System T-OP II System Push-OP System DBA615 Bushing Adapter 25 kV Deadbreak termination connectors Bol-T System T-OP II System Push-OP System DBA625 Bushing Adapter 35 kV Deadbreak termination connectors Bol-T System T-OP II System Push-OP System Optional 200 A. loadbreak tap No. 2637449C |
| <u>Elastimold (ESNA)</u> | 15 kV, used with non-loadbreak connectors 600, 650 Series 25 kV, used with non-loadbreak connectors K600, K650 Series 35 kV, used with non-loadbreak connectors 750LR Series |
| <u>Richards</u> | 15 kV, used with non-loadbreak connectors P615HH 25 kV, used with non-loadbreak connectors P625HH |
| <u>3M</u> | 15 kV, Deadbreak termination connectors 5815 Series Modular Splicing System |

U hb - Cable Accessories

(When ordering specify insulation diameter)

Concentric Neutral Clamps (Bonding)

| <u>Manufacturer</u> | <u>Conditions</u> |
|---------------------------------|--|
| <u>Harco</u> URD cable clamp | <ol style="list-style-type: none">1. To obtain experience.2. Only for bonding of anodes or other metals to the neutrals of <u>existing</u> cable installations.3. Not to be used to connect neutral to grounding electrodes. |

U hc - Cable Supports
15 and 25 kV

| Manufacturer | Catalog Number | Grip Dia. Range (inches) |
|--------------------|-----------------|--------------------------|
| Aluma-Form | CS-800 Series | 0.75 to 2.0 |
| Economy Cable Grip | SPJ087-U | 0.87 to 1.00 |
| | SPJ100-U | 1.00 to 1.12 |
| | SPJ113-U | 1.12 to 1.25 |
| | SPC125-S-U | 1.25 to 1.50 |
| Hubbell (Fargo) | GJ-854 | 0.718 to 0.919 |
| | GJ-855 | 0.920 to 1.12 |
| | GJ-856 | 1.12 to 1.50 |
| Kellums | 022-16-011 | 0.81 to 0.94 |
| | 022-16-012 | 0.87 to 1.00 |
| | 022-16-013 | 0.94 to 1.06 |
| | 022-16-014 | 1.00 to 1.18 |
| | 022-16-015 | 1.06 to 1.25 |
| | 022-01-018 | 1.25 to 1.50 |
| Lewis | A-U-SW-18 | 0.75 to 1.25 |
| | U-1.12 | 1.12 to 1.62 |
| Slater | FCSD 14 | 0.82 to 0.95 |
| | FCSD 15 | 0.88 to 1.00 |
| | FCSD 16 | 0.95 to 1.06 |
| | FCSD 17 | 1.01 to 1.19 |
| | FCSD 18 | 1.07 to 1.26 |
| | FC125-U | 1.25 to 1.50 |
| Woodhead | 35032 (SC075-U) | 0.75 to 0.99 |
| | 35033 (SC100-U) | 1.00 to 1.24 |
| | 35034 (SC125-U) | 1.25 to 1.49 |

U hd-1
July 2004

U hd - Brackets, pothead mounting, and Brackets, combination pothead and arrester mounting

| <u>Manufacturer</u> | <u>Single Phase</u> | <u>Three Phase</u> |
|---------------------|---------------------|--------------------|
| Aluma-Form | TB-EMB-1-2PA | TB-EMB-1-6PA |

U he - Enclosures, Sectionalizing Equipment

12.5/7.2 kV

| <u>Manufacturer</u> | <u>Catalog Number</u> |
|-----------------------------|---|
| <u>ABB</u> | UTE, PAD-PAK pad-mounted switching device, single and three-phase, 300 amp |
| <u>Durham</u> | AFSP Series, single-and three phase |
| <u>Electrical Equipment</u> | FTDF-P Series, single and three-phase one and two fused taps, pad-mounted |
| <u>Elliott</u> | Type EPMR, single and three-phase, pad-mounted |
| <u>Malton</u> | *ME Fused Series, single and three-phase pad mounted |
| <u>Shallbetter</u> | SPMD Series, single and three-phase, pad-mounted SPMC Series, 200 ampere single-pole switching |

*Furnished with current limiting fuses.

NOTES:

1. Enclosures on this page must comply with the dead-front requirements of RUS Spec. U-4.
2. These enclosures have been certified as meeting the requirements of ANSI C57.12.28. A copy of the certification is available from the manufacturer.
3. Single-pole switching of three-phase underground circuits may cause ferroresonance.

U he - Enclosures, Sectionalizing Equipment

24.9/14.4 kV

| <u>Manufacturer</u> | <u>Catalog Number</u> |
|---------------------|--|
| <u>ABB</u> | UTE, PAD-PAK pad-mounted switching device, single and three-phase, 200 amp |
| <u>Durham</u> | AFSP Series, single-and three phase |
| <u>Elliott</u> | Type EPMR, single- and three-phase, pad-mounted |
| <u>Malton</u> | ME Fused Series, single and three phase, pad- mounted |
| <u>Shallbetter</u> | SPMD Series, single and three-phase, pad-mounted |

NOTES:

1. Enclosures on this page must comply with the dead-front requirements of RUS Specification U-4.
2. These enclosures have been certified as meeting the requirements of ANSI C57.12.28. A copy of the certification is available from the manufacturer.
3. Single-pole switching of three-phase underground circuits may cause ferroresonance.

U he - Enclosures, Sectionalizing Equipment
(200 and 600 amp)

| <u>Manufacturer</u> | <u>Catalog Number</u> |
|---|--|
| <u>Cooper Power Systems</u> | Type VFI*, single-phase and three phase, padmounted fault interrupters, 15-35 kV Type R-VAC*, three-phase vacuum switchgear, 15-25 kV |
| *Cooper Envirotemp FR3 dielectric fluid is available as an option | |
| <u>Electrical Equipment</u> | Type PSI-PSI/II Series, 15 kV, 25 kV, 600 amp., three-phase switching, and 200 amp., single-phase switching. (When ordering, add suffix B-4) Type PSE Series, 15 kV, 25 kV, 600 amp switch, 200 amp fuse Type PGE Series, 15 kV, 25 kV, SF6 interrupter, 3-phase, 600 amp switch, 200 amp fuse |
| <u>Elliott</u> | Type EPMR, Single and three-phase, pad-mounted, 25 kV |
| <u>ERMCO</u> | Type FusePad, single-phase, 200 amp, 15 kV |
| <u>G & W</u> | Type PVI series, single-phase and three-phase, 200 amp and 600 amp, 15 kV and 25 kV |
| <u>Hubbell (Chance)</u> | Type LVS (pad-mounted) single-phase and three-phase, vacuum switching equipment, fused or unfused, 200 or 600 amp, 15-25 kV Type AIS padmounted, air insulated switchgear, fused or unfused, 200 or 600 amp, 15 kV or 25 kV |

Notes:

1. Enclosures on this page must comply with the deadfront requirements of RUS Spec. U-4.
2. These enclosures have been certified as meeting the requirements of ANSI C57.12.28. A copy of the certification is available from the manufacturer.
3. Single-pole switching of three-phase underground circuits may cause ferroresonance.

U he - Enclosures, Sectionalizing Equipment

(200 and 600 amp)

| <u>Manufacturer</u> | <u>Catalog Number</u> |
|-------------------------------------|---|
| <u>Kearney/Cooper Power Systems</u> | Series VP - submersible, single-phase and three-phase, vacuum switching, 200 or 600 amp, 15 and 25 kV, with or without VACOP remote operator |
| <u>Malton</u> | MES 100 Series, pad-mounted single phase and three phase switching |
| <u>Scott Engineering</u> | Type SPM-REA, 15 kV, 25 kV, 600 amp., three-phase switching, and 200 amp., single-phase switching |
| <u>S & C</u> | Mark III, Model PMH (with option G-7), 15-25 kV, 600 amp., three-phase switching and 200 amp., single-pole switching Model PME-15-25 kV, Fully enclosed live parts at all times, three-phase switching and 200 amp single pole switching |
| <u>Trayer</u> | 800 Series, pad mounted three-phase vacuum switching equipment, 200 and 600 amp, 15-25 kV with or without fusing 501 submersible vacuum fuse 15-25 kV enclosure, deadfront 200 or 600 amp., 15-25 kV Type SSA (submersible, fused and unfused) 200 and 600 amp., 15-25 kV |

Notes:

1. Enclosures on this page must comply with the deadfront requirements of RUS Spec. U-4.
2. The enclosures have been certified as meeting the requirements of ANSI C57.12.28. A copy of the certification is available from the manufacturer.
3. Single-pole switching of three-phase underground circuits may cause ferroresonance.

U hf - Jacketed Cable Restoration Kits
(For resealing concentric neutral wires after installation of splices in jacketed underground cable)

(When ordering, specify diameter of cable over jacket)

| Manufacturer | Conditions |
|--|-----------------------|
| <u>Elastimold</u> PCS-1 Power Cable Seal | To obtain experience. |
| <u>Homac</u> CNC Series Concentric Neutral Cover | To obtain experience. |
| <u>Joslyn</u> Shrinklite JRS Series | To obtain experience |
| <u>Raychem</u> WCSM (Tubing Type) MWTM (Tubing Type) CRSM (Wraparound Type) | To obtain experience. |
| <u>3M</u> HSJ Series (Heat Shrink) SJ Series (Cold Shrink) | To obtain experience. |

U hf - Terminator Sealing Kits

(For resealing concentric neutral wires after installation of elbows or outdoor terminations on jacketed underground cable.)

(When ordering, specify diameter of cable over jacket.)

| <u>Manufacturer</u> | <u>Conditions</u> |
|--|-----------------------|
| <u>Cooper Power Systems</u> JS200 Elastic Seal | To obtain experience. |
| <u>Elastimold</u> 200 ECS Elbow Cable Shield, Cold Shrink | To obtain experience. |
| <u>Homac</u> CNC Series Concentric Neutral Cover | To obtain experience. |
| <u>Raychem</u> ESA, Heat Shrink | To obtain experience. |
| <u>3M</u> 8450 Series, Cold Shrink | To obtain experience. |

U hf - Jacketed Cable Grounding Kits
(For connecting a grounding lead wire to the concentric neutral wires and resealing the jacket)

(When ordering, specify diameter of cable over jacket)

| Manufacturer | Conditions |
|---|-----------------------|
| <u>CANUSA-EMI</u> Model CFGK-REA Cable Grounding Kit | To obtain experience. |
| <u>Raychem</u> Model JGK Cable Grounding Kit | To obtain experience. |
| <u>3M</u> Model 2252 Cable Grounding Kit | To obtain experience. |

U hj-1
July 2004

U hj - Bracket, combination arrester, cutout and pothead mounting

Applicable Drawing: UM2, UM2A, UM2-4

| Manufacturer | Single Phase | Three-Phase |
|--------------|--------------------|-------------|
| Aluma-Form | 1HCA-18-1PB Series | - |

U hp - Terminations, Elbow
(rated for switching on three-phase systems)

(When ordering, specify conductor size, type, whether copper or aluminum and insulation diameter)

| <u>Manufacturer</u> | <u>Catalog Number</u> |
|-----------------------------|--|
| <u>Cooper Power Systems</u> | 15 kV, Loadbreak SBT IV LE215T Series with test point LE215 Series without test point 25 kV, Loadbreak SBT LE225T Series with test point LE225 Series without test point |
| <u>Elastimold (ESNA)</u> | 15 kV loadbreak Style 165LR, without voltage test point Style 166LR, with voltage test point Style 167LR, without voltage test point Style 168LR, with voltage test point 25 kV loadbreak Style 271LR, without voltage test point Style 272LR, with voltage test point Style 273LR, without voltage test point Style 274LR, with voltage test point 35 kV loadbreak Style 375LR, without voltage test point Style 376LR, with voltage test point |
| <u>Hubbell (Chardon)</u> | 15 kV, Loadbreak 9U01A--6--Series 25 kV, Loadbreak 9U01B--5--Series |

U hq - Terminations, Multipoint

(Items on this page are rated for operation on three-phase systems and may be used on single-phase systems)

| Manufacturer | Catalog Number |
|-----------------------------|--|
| <u>Cooper Power Systems</u> | 15 kV 2-way, 3-way,& 4-way bushings Series 2637172B with mounting bracket Series 2637164C without mounting bracket 25 kV 2-way, 3-way,& 4-way bushings Series 2637160B with mounting bracket Series 2637166C without mounting bracket |
| <u>Elastimold (ESNA)</u> | 15 kV 2-way bushing, 163J2 3-way bushing, 163J3 4-way bushing, 163J4 25 kV 2-way bushing, 271J2 3-way bushing, 271J3 4-way bushing, 271J4 35 kV 2-way bushing, 373J2 3-way bushing, 373J3 4-way bushing, 373J4 |
| <u>Hubbell (Chardon)</u> | 15 kV 2-way bushing 9U07A--2-0 3-way bushing 9U07A--3-0 4-way bushing 9U07A--4-0 25 kV 2-way bushing 9U07B--2-0 3-way bushing 9U07B--3-0 4-way bushing 9U07B--4-0 |

U hq - Terminations, Feed-Through and Parking Bushings

| <u>Manufacturer</u> | <u>Catalog Number</u> |
|-----------------------------|--|
| <u>Cooper Power Systems</u> | 15 kV Insulated Standoff Bushing, 2625063B01M 25 kV Insulated Standoff Bushing, 2625064B01M |
| <u>Elastimold (ESNA)</u> | 35 kV Feed-thru, 373FT Parking Bushing, 371SOP |
| <u>Hubbell (Chardon)</u> | 15 kV Feed-through, 9U07AKF200 Insulated Parking Bushing, 9U07ACF100 Grounded Parking Bushing, 9U07AAF100 25 kV Feed-through, 9U07BCF200 Insulated Parking Bushing, 9U07BCF100 Grounded Parking Bushing, 9U07BAF100 |

U hq - Terminations, Multipoint

600 Ampere Continuous Current Rating

| <u>Manufacturer</u> | <u>Catalog Number</u> |
|-----------------------------|--|
| <u>Cooper Power Systems</u> | 15 kV and 25 kV 2-way, 3-way, and 4-way bushings Series DJ625A_ (with mounting bracket) Series DJ625A_B_ (without mounting bracket) 35 kV 2-way, 3-way, and 4-way bushings Series 2637195C (with mounting bracket) Series 2637184C (without mounting bracket) |
| <u>Elastimold (ESNA)</u> | 15 kV 2-way bushing, 650J2 or 675J2 3-way bushing, 650J3 or 675J3 4-way bushing, 650J4 or 675J4 25 kV 2-way bushing, K650J2 or K675J2 3-way bushing, K650J3 or K675J3 4-way bushing, K650J4 or K675J4 |

U hr - Secondary tap or splice cover, submersible

| Manufacturer | Type or Catalog No. |
|------------------------------|--|
| Blackburn | Type WDBS (#2 through #4/0), Type DBS (250 kcmil through 1000 kcmil) |
| Connector Mfg. Co. | Utilug Sure Seal |
| Elastimold (ESNA) | Style 86 |
| ESP | TSC Series |
| Homac | FSS Series |
| Joslyn | Shrinktite JCLS Series |
| Kearney/Cooper Power Systems | Aqua-Seal Kit |
| Preformed | HT Series |
| Plymouth/Bishop | Splice-Wrap |
| Raychem | Rayvolve RVS Series |
| 3M | PST Series 8420 |

Heat Shrink Tubing (with sealant throughout)

| Manufacturer | Type or Catalog No. |
|-----------------------|---|
| AMP | Black heat-shrink tubing |
| CANUSA-EMI | CFW |
| ESP | HSB |
| Panduit | Heat shrink insulating cover and tubing |
| Raychem | WCSM cable sleeves |
| Sigmaform Corporation | Sigmaform heat-shrinkable products |
| 3M | ITCSN tubular cable sleeve |

U hv-1
July 2004

U hv - Cable, Underground
15 kV and 25 kV Cable

| | |
|---------------------------|--|
| Applicable Specification: | RUS Specification U-1 |
| Conductor (15 kV): | Copper or Aluminum - #2 AWG through 1000 kcmil |
| Conductor (25 kV): | Copper or Aluminum - #1 AWG through 1000 kcmil |
| Insulation: | Crosslinked Polyethylene (XLP) (a) indicates Union Carbide 4201 XLP (b) indicates BP 521 XLP Tree-retardant Crosslinked Polyethylene (XLP-TR) (1) indicates Union Carbide 4202 XLP-TR (2) indicates BP H119Y XLP-TR (3) indicates BP H118Y XLP-TR Ethylene Propylene Rubber (EPR) |
| Neutral: | Copper Concentric Neutral |
| Jacket: | High Molecular Weight Polyethylene |

| Manufacturer | Insulation(s) | Flat Strap Neutral Available |
|-------------------------------------|--------------------------------|------------------------------------|
| Conductores Monterrey, S.A. de C.V. | XLP (a), XLP-TR (1), EPR | No |
| Conduxmex | XLP (a), XLP-TR (1), EPR | No |
| General Cable | XLP (a,b), XLP-TR (1,3), EPR | Yes |
| Hendrix | XLP (a), XLP-TR (1, 2, 3), EPR | No |
| Hubbell (Kerite) | EPR | Yes |
| Nexans Canada | XLP (a), XLP-TR (1), EPR | No |
| Nexans Italia | EPR | No |
| Okonite | XLP (a), XLP-TR (1), EPR | Yes |
| Pirelli | XLP (a), XLP-TR (1), EPR | Yes |
| Rome | XLP (a), XLP-TR (1), EPR | Yes |
| Southwire | XLP (a), XLP-TR (1), EPR | No |

U hv - Cable, Underground

600 Volt Cable

Applicable Specification: RUS Specification U-2

Conductor: Copper, #4 AWG and larger; Aluminum, #2 AWG and larger

Insulation: Cross-Linked polyethylene (XLPE)

| <u>Manufacturer</u> | <u>Type Conductor</u> |
|--------------------------------------|-----------------------|
| Alcan | Aluminum |
| Conductorres Monterrey, S.A. de C.V. | Copper or Aluminum |
| Condumex | Copper or Aluminum |
| Essex | Copper |
| General Cable | Copper or Aluminum |
| Nexans Canada | Aluminum |
| Okonite | Copper or Aluminum |
| Pirelli | Copper or Aluminum |
| Rome Cable | Copper or Aluminum |
| Service Wire Company | Copper |
| Southwire | Copper or Aluminum |

NOTE: The manufacturers shown above have indicated that their 600 volt cable is suitable for use on 480 volt corner grounded delta circuits.

The above cable may be supplied with UL label for Type USE.

U hv - Cable, Underground

600 Volt Multi-Conductor Cable

Applicable Specification: RUS Specification U-2

Conductor: Copper, #4 AWG and larger; Aluminum, #2 AWG and larger

Insulation: Cross-Linked polyethylene (XLPE)

Cable Configuration: 3 Insulated Conductors Triplexed

| <u>Manufacturer</u> | <u>Type Conductor</u> |
|-------------------------------------|-----------------------|
| Alcan | Aluminum |
| Conductores Monterrey, S.A. de C.V. | Copper or Aluminum |
| Condumex | Copper or Aluminum |
| General Cable | Copper or Aluminum |
| Nexans Canada | Aluminum |
| Okonite | Copper or Aluminum |
| Pirelli | Copper or Aluminum |
| Rome Cable | Copper or Aluminum |
| Southwire | Copper or Aluminum |

The above cable may be supplied with UL label for Type USE.

U hv - Cable, Underground
15 kV and 25 kV Cable

(Alternative Insulation Compound)

Applicable Specification: RUS Specification U-1
 Conductor (15 kV): Copper or Aluminum - #2 AWG through 1000 kcmil
 Conductor (25 kV): Copper or Aluminum - #1 AWG through 1000 kcmil
 Insulation: Tree-retardant Crosslinked Polyethylene (XLP-TR)
 (I) indicates Pirelli IE.7100 XLP-TR
 (II) indicates AT Plastic PowerGuard 320TR
 (III) indicates Union Carbide HFDB-4202
 (IV) indicates Nova Borealis LE 4212
 (V) indicates Dow HFDB 8202
 Neutral: Copper Concentric Neutral
 Jacket: High Molecular Weight Polyethylene
 Conditions: To obtain experience

| <u>Manufacturer</u> | <u>Insulation(s)</u> | <u>Flat Strap Neutral Available</u> |
|---------------------|-------------------------|-------------------------------------|
| General Cable | XLP-TR (II, III, IV, V) | Yes |
| Hendrix | XLP-TR (III, IV) | No |
| Nexans Canada | XLP-TR (II, III, IV) | No |
| Pirelli | XLP-TR (I, IV) | Yes |
| Southwire | XLP-TR (III, IV) | No |

U hv - Cable, Underground

600 Volt Cable

(Alternative Cable Constructions)

Applicable Specification: RUS Specification U-2 (except as indicated below)

NOTE: Manufacturers listed below are conditionally accepted for alternatives A, B, C , and/or D for the products listed on pages U hv-2 and U hv-3.

Alternative A: 8000 series aluminum alloy in accordance with ASTM B800 or B801.

Alternative B: Stranding in accordance with ASTM B786 for aluminum 1350 conductors
or ASTM B787 for copper conductors.

Alternative C: Abuse resistant (ruggedized) (single or two layer) insulation in accordance
with ICEA S-81-570.

Alternative D: Self-healing

Condition: To obtain experience.

| <u>Manufacturer</u> | <u>Alternative</u> |
|---------------------|--------------------|
| Alcan | (C) |
| BICC | (A) (C) |
| Pirelli | (A) (C) (D) |
| Nexans | (C) |
| Southwire | (A) (B) (C) (D) |

U hw - Warning sign

Applicable Specifications: RUS Drawings UM12-1 and UM12-2

| Manufacturer | Size (inches) | Danger Sign Catalog No. | Caution Sign Catalog No. |
|---|---------------|----------------------------|-----------------------------|
| Brady* | 7 x 10 | 46133 | 46043 |
| | 10 x 14 | 46131 | 46041 |
| Eastern Metal* | 7 x 10 | REA 12-1-710 | REA 12-2-710 |
| | 10 x 14 | REA 12-1-1014 | REA 12-2-1014 |
| | 14 x 20 | REA 12-1-1420 | REA 12-2-1420 |
| | 20 x 28 | REA 12-1-2028 | REA 12-2-2028 |
| Electromark* | 7 x 10 | REA-1-7x10-SV | REA-2-7x10-SV |
| | 7 x 10 | REA-1-7x10-AC | REA-2-7x10-AC |
| | 10 x 14 | REA-1-10x14-SV | REA-2-10x14-SV |
| | 10 x 14 | REA-1-10x14-AC | REA-2-10x14-AC |
| | 14 x 20 | REA-1-14x20-SV | REA-2-14x20-SV |
| | 14 x 20 | REA-1-14x20-AC | REA-2-14x20-AC |
| | 20 x 28 | REA-1-20x28-SV | REA-2-20x28-SV |
| | 20 x 28 | REA-1-20x28-AC | REA-2-20x28-AC |
| Lem | 7 x 10 | LSS-1400 | LSS-1500 |
| | 10 x 14 | LSS-1401 | LSS-1501 |
| | 14 x 20 | LSS-1402 | LSS-1502 |
| Lyle* | 7 x 10 | UM12-1-710 | UM12-2-710 |
| | 10 x 14 | UM12-1-1014 | UM12-2-1014 |
| | 14 x 20 | UM12-1-1420 | UM12-2-1420 |
| | 20 x 28 | UM12-1-2028 | UM12-2-2028 |
| May Advertising | 7 x 10 | MY710C | MY710B |
| | 10 x 14 | MY1014C | MY1014B |
| | 14 x 20 | MY1420C | MY1420B |
| | 20 x 28 | MY2028C | MY2028B |
| For pressure sensitive decal add "D" prefix | | | |
| Truck Sign Service* | 7 x 10 | TSD-710 | TSC-710 |
| | 10 x 14 | TSD-1014 | TSC-1014 |
| | 14 x 20 | TSD-1420 | TSC-1420 |
| | 20 x 28 | TSD-2028 | TSC-2028 |

*Reflective signs also available.

The signs listed on this page are to be secured to equipment and transformer enclosures by means of an adhesive or by welding. Screws and rivets are not to be used.

U hx - Cable Route Marker

| Manufacturer | Catalog Number |
|---|--|
| <u>Surface Mounted</u> | |
| Hubbell (Chance) | C554-0001 |
| <u>Above Grade</u> | |
| Carsonite | REA-100 |
| Electromark | REA-3-4x7-SV REA-3-4x7-AC REA-3-5x12-SV REA-3-5x12-AC |
| Flexstake | 603, 604, 605, 606 |
| Greenline | FLU-78 (Decal on one side) DSU-78 (Decal on both sides) |
| Hubbell (Chance) | C554-0183 |
| J Miller Industries | JMI-375 |
| Lyle | UM12-712 |
| May Advertising (For pressure sensitive decal add "D" prefix to catalog number.) | MY45A, MY712A |
| Quantum | QM-375 |
| Truck Sign Service | BCW-712 |
| W. H. Brady | BL1 (Decal on one side) BL2 (Decal on both sides) |

U hy - Splice, Underground, Permanent

(when ordering, specify conductor size, type, whether copper or aluminum and insulation diameter)

| <u>Manufacturer</u> | <u>Catalog Number</u> |
|-----------------------------|---|
| <u>Cooper Power Systems</u> | <u>15 kV and 25 kV</u> EZ II straight and transition splice #3 through 4/0 <u>35 kV</u> 2603934B Series straight splice |
| <u>Elastimold (ESNA)</u> | <u>15 kv</u> Style 1500S, straight splice, through #1/0 Style 25-S, straight splice, 2/0 through 4/0 Style I5PCJ-1, straight splice, through 4/0 Style 25-Y, Y-splice <u>25 kV</u> Style K-25-S, straight splice Style K-25-Y, Y-splice Style 25PCJ-1, straight splice, through 4/0 <u>35 kV</u> Style M-250-S, straight splice |
| <u>DSG-Canusa</u> | <u>15 kV</u> CJ 10 Series, heat shrinkable joints <u>25 kV</u> CJ 10 Series, heat shrinkable joints <u>35kV</u> CJ 10 Series, heat shrinkable joints |
| <u>Hubbell (Chardon)</u> | <u>15 kV</u> Straight Splice through #1/0, Model 9U16A-100 "Uni-Matic" Through #2/0, Model 9U06A <u>25 kV</u> "Uni-Matic" Through #2/0, Model 9U06A |
| <u>Pirelli</u> | <u>15 kV and 25 kV</u> "Elaspeed" style EPJMe straight splice, #2 through 1000 kcmil |
| <u>3M</u> | <u>(15, 25, 35 kV)</u> 5400 Series Quick Splice/Quick Splice II/Quick Splice III, 15 kV 5411R cable repair splice 5411R/HSJ-I cable repair splice (for jacketed cable) |

U hy - Splice, Underground, Permanent

(When ordering specify conductor size, type, whether copper or aluminum and insulation diameter)

| <u>Manufacturer</u> | <u>Catalog Number</u> |
|-----------------------|--|
| <u>Raychem</u> | <u>15 kV</u> HVS 1510-R__ 200 Amp Splice kit |
| | <u>25 kV</u> For Bare Concentric Neutral Cable: HVS-2510-REAX in-line joint HVS-2510E-R-REAX repair joint For Jacketed Cable: HVS-2510-JCN-REAX in-line joint HVS-2510E-RJ-REAX repair joint |
| | <u>35 kV</u> For Bare Concentric Neutral Cable: HVS-3510E-REAX in-line joint For Jacketed Cable: HVS-3510E-JCN-REAX in-line joint |
| <u>Sigmaform</u> | <u>15 kV</u> SSK Series (Heat Shrink) |
| <u>Tyco (Raychem)</u> | <u>15 kV</u> CAS-15WJ-2, cold-applied splice |
| | <u>25 kV</u> For Jacketed Cable: CAS-28WJ-2, cold-applied splice |
| | <u>35 kV</u> For Jacketed Cable: CAS-35M, cold-applied in-line splice |

U hy - Splice, Underground, Separable

(When ordering specify conductor size, type, whether
copper or aluminum and insulation diameter)

| <u>Manufacturer</u> | <u>Catalog Number</u> |
|--------------------------|---|
| <u>Elastimold (ESNA)</u> | 15 kV Style 151-SR, receptacle Style 151-SP, plug Style 150-DP, deadend plug Style 150-DR, deadend receptacle Style 150-T, T-tap |
| | 25 kV Style K-151-SR, receptacle Style K-151-SP, plug Style K-150-DR, deadend receptacle Style K-150-T, T-tap |

U hy-3
July 2004

U hy - Splice, Underground, Permanent

(When ordering specify conductor size, type, whether
copper or aluminum and insulation diameter)

600 Ampere Continuous Current Rating

| <u>Manufacturer</u> | <u>Catalog Number</u> |
|-----------------------------|---|
| <u>Cooper Power Systems</u> | 15 kV 2604904B Series straight splice (MPS-600) |
| | 25 kV 2604905B Series straight splice (MPS-600) |
| <u>Elastimold (ESNA)</u> | 15 kV Style 650-S, straight splice Style 15PCJ-2, straight splice, through 1250 kcmil Style 650-Y, Y-Splice |
| | 25 kV Style K650-S, straight splice Style K650-Y, Y-splice Style 25 PCJ-2, straight splice, through 1250 kcmil |
| | 35 kV Style M650S, straight splice |

U ja - Equipment Flat Pad*

| <u>Manufacturer</u> | <u>Catalog Number</u> |
|--|---|
| <u>Armorcast</u> | 600 Series, Polymer Concrete P600XXXX Rotocast, LLDPE |
| <u>Associated Plastics</u> | API 4000 Series RPM |
| <u>Carolina Dielectrics</u> | Model 0502-1, Fiberglass, Size:40"x44" |
| <u>CDR Systems (Homac)</u> | PP Series, Fiber reinforced polymer concrete |
| <u>Diversitech</u> | TP Series - Fiberglass reinforced concrete |
| <u>Electri-Glass</u> | Fiberglass LP-4145, 41" x 45" |
| <u>Electrical Materials</u> | Molded HMW Polyethylene Model 64-3BC, 42" x 41" x 4" Model 65-4BC, 52" x46" |
| <u>Electrimold</u> | EPPT |
| <u>Fiberglas Fabricators</u> | FFBPPC Series, Polymer concrete hybrid |
| <u>Formex</u> | Mode1 TP-REA, Molded polyethylene |
| <u>Heil Rotomold, Inc.</u> | T Series, High density polyethylene |
| <u>Highline</u> | HL-46B, Fiberglass, Size: approx.42"x42" |
| <u>Hubbell (Chance)</u> | C107-0162 Fiberglass, Size: 40" x 44" |
| <u>Major Frame-Crete</u> | ETPP precast, cellular concrete, 42"x42" |
| <u>Nordic</u> | TP Series, Fiberglass |
| <u>Parking Bumper Company</u> <u>- a Division of Hog Slat, Inc.</u> | 7610, 7612, 7613, 7626PE, 7621 |
| <u>PenCell Plastics</u> | TP-4220, TP-4224, TP-4227 |
| <u>Quality Rubber Company</u> | 34242 light-weight concrete |
| <u>Quazite Corp.</u> | Composolite - PH Series |
| <u>RMI-D</u> | Dwg. No. 730126-2, Molded polyethylene Size: 42" x 42" |
| <u>Smith Cattleguard</u> | Easi Set T. Series, Precast Reinforced Concrete |
| <u>Thermodynamics</u> | Poly-Pad, PR Series, Molded polyethylene |

*Order by catalog number and size.

| Manufacturer | U ja - Equipment Box Pad (Sleeve)* Catalog Number |
|-----------------------------------|---|
| <u>Acura Fiberglass Corp.</u> | Model AG 4532 |
| <u>Associated Plastics</u> | Transformer pad and box assembly, API 4242 RPM Pad and 1730 Box Transformer Pads, API 16 and API 45 |
| <u>Blue Grass Vault Company</u> | BG-PV-T, BG-PV-1, BG-PV-2 |
| <u>Concast</u> | Fibercrete modular bases |
| <u>Custom Composites</u> | R Series Fiberglass |
| <u>D & L</u> | Fiberglass |
| <u>Electri-Glass, Inc.</u> | BP-2000 |
| <u>Electrimold</u> | EFBT,EFBS,EFBG Series |
| <u>Fiberglas Fabricators</u> | Transformer pad and sleeve assembly, FFBP series |
| <u>Formex</u> | Transformer pad and box assembly - TP-REA Series Pad, 1730-A Series Box |
| <u>Highline</u> | Box pad HL-45A, Size: L-43", W-34-1/2", D-32" Model AG 4532 |
| <u>Malton</u> | FGS Series Fiberglass ground sleeves and box pads |
| <u>Maysteel</u> | CW-GS-P Series |
| <u>Mor-Tech Fab</u> | Transformer pad ground sleeves |
| <u>Nordic</u> | GS Series Fiberglass (excluding GS-37-43-15-A) CBP-37-43-15-A |
| <u>PenCell</u> | Transformer pad and box assembly- TPS-20-PE Pad, PE-20GS Box |
| <u>ProGlass, Inc.</u> | TX, SR, S, and SG Series (All without optional lids) |
| <u>Quality Fiberglass</u> | QF Series |
| <u>Synertech Moulded Products</u> | S1212, S1118, S1324, S1730, S2436, S3048 and S3660 |
| <u>Thermodynamics</u> | Poly Pad - VC series (VCC-P series covers available) Polyethylene |

*Order by catalog number and size.

U jb-1
July 2004

U jb - Splice Shield
(Refer to Drawing UK5)

| Manufacturer | Catalog Number |
|----------------|-----------------|
| <u>Kellems</u> | No. 014-03-1429 |

Conditional List
U sc(1)
July 2004

U sc - Regulators, voltage, pad-mounted
for underground distribution

12.5/7.2 kV

| Manufacturer | Conditions |
|---|-----------------------|
| <u>Siemens-Allis</u> Single-phase, step-type pad-mounted regulator Type PFR (76.2, 114.3 & 167 kVA) | To obtain experience. |

U sd - Current Transformers
600 Volt

Direct Burial Type

| <u>Manufacturer</u> | <u>Type or Catalog No.</u> |
|---------------------|----------------------------|
| General Electric | JAL-O |

Indoor Type for Pad-Mounted Transformers

| <u>Manufacturer</u> | <u>Type or Catalog No.</u> |
|----------------------------------|----------------------------|
| ABB | CMV |
| G.E.C. Durham Industries (Astra) | AP |
| General Electric | JAB-O |
| Schlumberger | R6P |

U si-1
July 2004

U si - Anodes, Sacrificial
(Drawings UM11-1, UM26, UM27, M2-7, M2-17)

Zinc Anodes*

| | <u>Pre-packaged With Connecting Wire</u> | | | <u>Bare Continuous Strip (Ribbon)</u> | |
|------------------------------|--|----------------|----------------|---------------------------------------|---------------------|
| | <u>12 lbs.</u> | <u>30 lbs.</u> | <u>60 lbs.</u> | <u>5/8" x 7/8"</u> | <u>1/2" x 9/16"</u> |
| Cathodic Protection Services | 12HII-4A | 30HII-4A | 60HII-4A | | |
| Federated Metals | S-12 packaged | S-30 packaged | S-60 packaged | Regular Size Type II | Junior size |
| Harco | AZC12GJ | AZC30GJ | AZC60HJ | | |
| Mesa | S-12 packaged | S-30 packaged | S-60 packaged | Regular Size | Junior size |
| Stuart | SZ-12 | SZ-30 | SZ-60 | | |
| | -----VIBROX packaged----- | | | | |

*When ordering, specify zinc anodes that meet ASTM B418-73 Type II Composition and RUS Specification DT-9, "RUS Specification for Zinc Sacrificial Anodes."

U si - Anodes, Sacrificial
(Drawings UM11-1, UM26, UM27, M2-7, M2-17)

Magnesium Anodes**

| | Standard Potential | | | | High Potential | | | |
|------------------------------|--------------------|--------|-----------------|-----------------|-------------------------|---------------|-------------------------|-------------------------|
| | 17 lbs | 20 lbs | 32 lbs | 50 lbs | 17 lbs | 20 lbs | 32 lbs | 48 lbs |
| Cathodic Protection Services | AMH17A packaged | - | AMH32A packaged | AMH50A packaged | 17D3 packaged | 20D2 packaged | 32D5 packaged | 48D5 packaged |
| Federated Metals | 17 packaged | - | 32 packaged | 50 packaged | - | - | - | - |
| Global Cathodic Protection | - | - | - | - | 17D2 | 20D2 | 32D3 | 48D5 |
| Harco | AMC17J | AMC20J | AMC32J | AMC50J | AMC17G | AMC20G | AMC32G | AMC48G |
| Kaiser Mag. | 17 Vibra Pak | - | 32 Vibra Pak | 50 Vibra Pak | 17 Electromag Vibra Pak | - | 32 Electromag Vibra Pak | 50 Electromag Vibra Pak |
| Mesa | 17 packaged | - | 32 packaged | 50 packaged | 17D Series | 20D2 | 32D Series | 48D5 |
| Stuart | SM-17 | - | SM-32 | SM-50 | SM-17H | - | SM-32H | SM-48H |

**When ordering, specify magnesium anodes that meet RUS Specification DT-10, "RUS Specification for Magnesium Sacrificial Anodes."